User Guide

V^{2}IU 4300T Converged Network Appliance

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Trademark Information

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1

Introduction

The 4300T Converged Network Appliance

The V^{2}IU 4300T is an intelligent, all-in-one networking solution for enterprises and service providers. It reduces costs by simplifying the deployment, management and security of converged voice, video and data networks. The 4300T provides the following important functions for converged networks:

T1 Wide Area Network (WAN) Access Router

The 4300T provides an integrated T1 CSU/DSU for small and medium office connectivity.

Security

A stateful packet inspection firewall is used in combination with a VoIP application layer gateway to provide comprehensive "media-aware" security. The 4300T also supports IPSec for secure site-to-site networking.

VoIP

The 4300T resolves NAT/FW traversal problems for SIP, MGCP and H.323 traffic. It allows a single public IP address to be used for multiple VoIP clients. VoIP survivability is also provided by the 4300T so that local SIP PSTN gateways can be used for inbound/outbound calling during WAN link failures.

Quality of Service

The 4300T maximizes WAN link utilization while optimizing voice quality using prioritization and shaping.

Call Quality Monitoring

Passive call quality monitoring for each SIP or MGCP voice call includes statistics needed to enforce SLAs and resolve networking problems that negatively affect call quality.

Future-proof Scalability

The 4300T is a powerful, flexible platform that can be deployed initially as a low-cost WAN access router and then licensed through software for more advanced VoIP features and increased call performance. It is the ideal platform for service providers offering DIA, hosted VoIP and managed security services or enterprises migrating to converged voice and data networks.

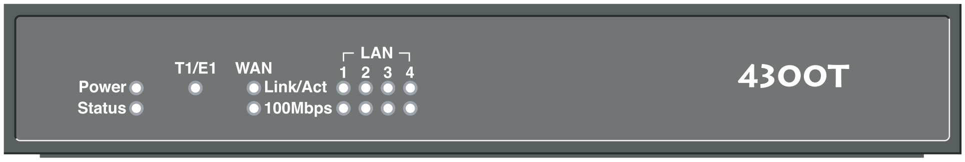
Feature Summary

- VoIP
  - SIP, MGCP(for voice) and H.323 (for video) application layer gateway enables a single public IP address to be used for multiple VoIP endpoints
  - VoIP survivability provides local call switching to PSTN gateways during WAN link failures (SIP only)
- QoS
  - Class based queuing/prioritization
  - Diffserv marking and policing
  - Traffic shaping
  - VoIP call admission control prevents oversubscription of priority queue
- Security
  - Stateful packet inspection firewall
  - VoIP aware firewall dynamically provisions and closes UDP ports used for VoIP calls
  - IPSec: 3DES, SHA-1
  - NAT/PAT server hides enterprise LAN topology
- Passive Call Quality Monitoring
  - Per call statistics include mean opinion score (average and minimum), jitter, latency, packet loss and much more
  - Alarms for poor MOS scores

- Active call count indicators

Front Panel LEDs

The LEDs display real-time information for key functions of the 4300T. They are as follows:

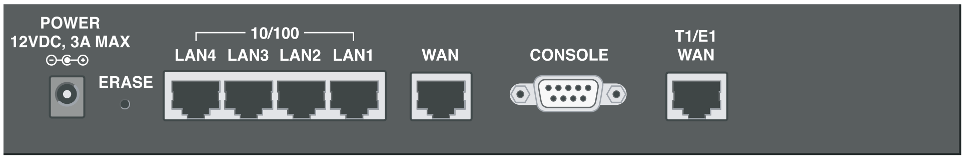


EM001

LED Label	Activity	Description
Power	Off	Power switch off (or no power from wall)
	Green	Power is supplied to the unit
Status	Off	Self-tests have failed. The unit has not booted.
	Green	Self-tests completed successfully
	Flashing	Indicates configuration is being written to permanent storage or an upgrade is in progress
T1/E1	Off	The T1 is in an alarm state and not synchronized
	Green	T1/E1 in-sync, no alarms
LAN	Link/Act	Flashing indicates activity. On indicates a connection
	100Mbps	On = 100Mbps link speed, Off = 10Mbps link speed
Ethernet WAN	Link/Act	Flashing indicates activity. On indicates a connection
	100Mbps	On = 100Mbps link speed, Off = 10Mbps link speed

Back Panel

The back panel of the 4300T contains the following (left to right):



EM002

- Power connector
- Erase button
- Power connector
- 4 switched LAN Ethernet ports
- Management console port
- T1 WAN port (RJ-48 with built-in CSU/DSU)
- Ethernet WAN port

Power Connector

The 4300T comes with an AC power cord and power adapter for connecting to this port. Little force is necessary when the plug is properly positioned.

Erase Button

To erase any custom configuration and restore the 4300T to its factory default state depress the erase button once and press again before 2 seconds expires.

Warning

Using the Erase button as outlined above means any configuration made to the 4300T will be lost. Additionally the VoIP ALG registration code must be re-entered in the 4300T as covered in *Chapter 4: System Diagnostics, viewing the ALG registration code*. Erasing the configuration means that IP phones installed behind the 4300T will not work and Internet connectivity or network access for PCs will be down until the system is reconfigured.

Management console port

This port is used to establish a local console session with the 4300T using a VT100 terminal or emulation program. The cable required is a straight-through 8-wire cable. The serial port uses a baud rate of 9600, 8 data bits, 1 stop bit and no parity.

This port is used for debug or local diagnostic purposes only. Primary configuration of the 4300T is performed from a web browser as covered in Chapter 3.

T1/E1 WAN port

The T1 WAN interface with the following features:

- Fully integrated CSU/DSU
- T1 support
- Fractional T1 support
- Layer 2 protocol support for: HDLC, Cisco HDLC (cHDLC), PPP, Frame Relay
- On-board RJ-48 connector for easy direct connection
- T1/E1 framer and transceiver
  - B8ZS/HDB3 zero suppression
  - Response to Inband Loop codes
  - Manual payload loop through the GUI
- External transmit clock input and receive clock output headers
- Timing: internal or external (loop times from the network)
- Provides long haul CSU or short haul DSU signaling
- Meets FCC part 68 protection requirements

The WAN port is used for connection to a data T1 line. The device at the far end of the line is a router or other device expecting TCP/IP data. Individual DS-0 channels on the T1 are not used to carry uncompressed voice.

Ethernet WAN port

The Ethernet 10/100 Mbps port on the 4300T can be used as a WAN interface as an alternative to the T1 interface. This port is typically used when connecting the 4300T to an existing T1/E1 WAN router, cable or xDSL modem.

2

Getting Started

Physical Installation

The 4300T is designed for desktop, rack or wall-mount installation. Please observe the following guidelines when installing the system:

- Never assume that the AC cord is disconnected from a power source. Always check first.
- Always connect the AC power cord to a properly grounded AC outlet to avoid damage to the system or injury.

Ensure that the physical location of the installation has adequate air circulation and meets the minimum operating conditions as provided in the environmental specifications for the system.

Warning Secure the power supply using a fastener or nearby shelf so that it does not hang from the power connector.

Desktop Installation

1. Remove the 4300T and accessories from the shipping container.
2. Place the 4300T on a flat, dry surface such as a desktop, shelf or tray.
3. Connect the power and network cables to the appropriate ports on the back of the system.

Caution To reduce the risk of fire, use only 26 AWG or larger wire (e.g. 24, 22, 20, etc.) to connect the T1 port on your unit to an RJ-45 jack.

Wall-Mount Installation

The 4300T can be wall-mounted using the two mounting brackets on the bottom of the appliance. We recommend using two round or pan head screws.

Install two screws 4 14/16" horizontally apart on a wall or other vertical surface. The screws should protrude from the wall so that you can fit the appliance between the head of the screw and the wall.

1. If you install the screws in drywall use hollow wall anchors to ensure that the unit does not pull from the wall due to prolonged strain from the cable and power connectors.
2. Remove the 4300T and accessories from the shipping container.
3. Hang the 4300T on the wall.
4. Connect the power and network cables to the appropriate ports on the back of the system.

Warning

> Secure the power supply using a fastener or nearby shelf so that it does not hang from the power connector.

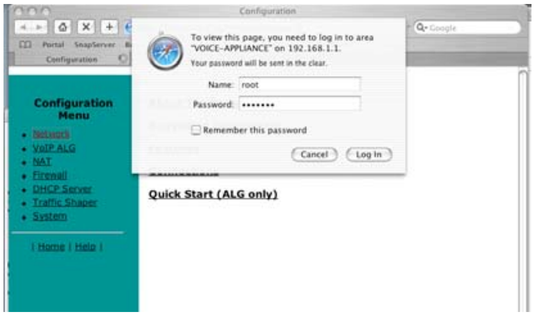
Caution

> To reduce the risk of fire, use only 26 AWG or larger wire (e.g. 24, 22, 20, etc.) to connect the T1 port on your unit to an RJ-45 jack.

Administration of the 4300T

The 4300T is configured using a web browser such as Internet Explorer or Netscape Navigator. The 4300T is shipped with a pre-configured IP address for its LAN port of 192.168.1.1. To connect to the 4300T, do the following:

1. Connect a PC using an IP address of 192.168.1.2 and subnet mask of 255.255.255.0 to LAN port 4 of the 4300T.
2. Launch a web browser on the PC and enter the URL string: 192.168.1.1. Press Return. The initial 4300T main configuration menu appears.
3. Select the Network link - enter the username root and the password default to log into the system.



To view this page, you need to log in to area "VOICE-APPLIANCE" on 192.168.1.1.

Your password will be sent in the clear.

Name: root

Password: •••••••

□ Remember this password

Note

For secure management of your network, be sure to change the default userid and password as described under *Change the Administration Password*.

4. Continue to configure the system using the information provided in Chapter 3.

3

Configuring the 4300T

The 4300T is a flexible, easy to use converged network appliance that provides many critical networking functions for IP based voice, video and data. It can be installed in several different topologies:

- At the customer premise for IP Centrex and hosted video applications
- At the station side of enterprise IP PBXs
- At the trunk side of enterprise IP PBXs
- At the public/private IP address boundary for enterprise video applications

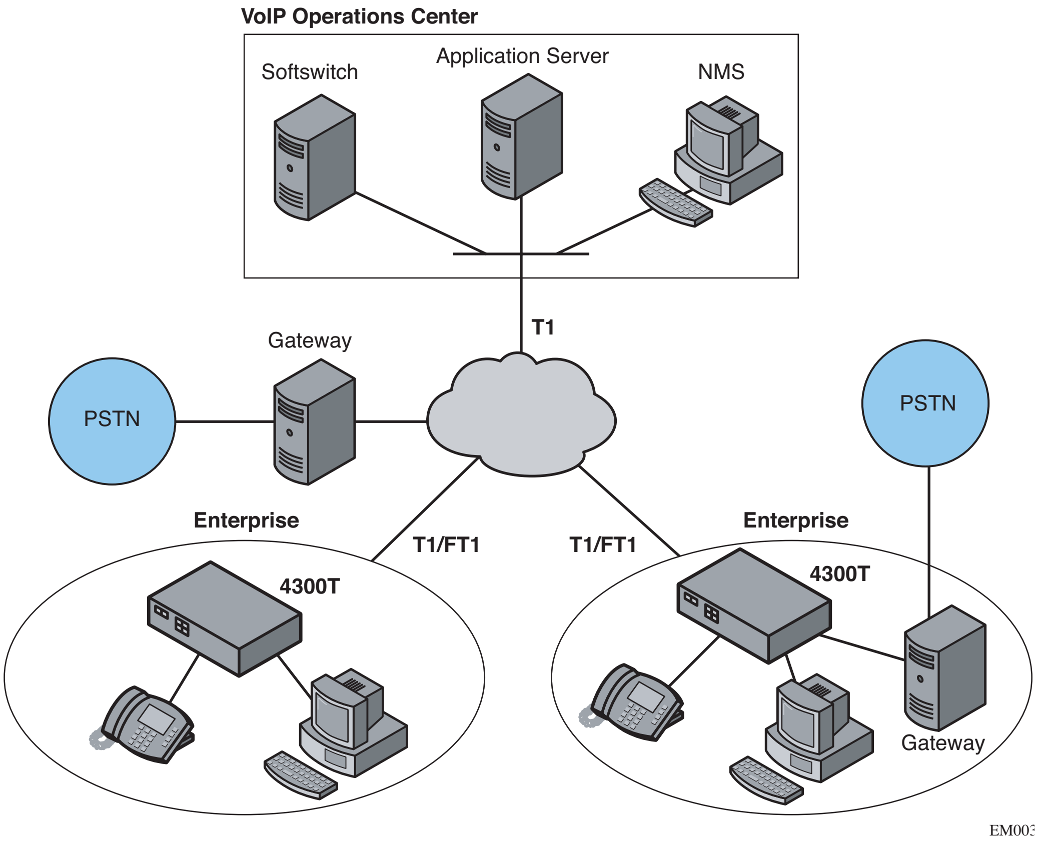
Most users will follow the steps provided in the "Configuring The Systems Settings" section of this manual to initially connect the 4300T into their IP network. The remainder of the configuration can be different based on the application, VoIP topology and presence of other networking equipment such as firewalls or DHCP servers. In general, however, the steps used to configure the 4300T are:

Step	Task
1	System configuration
2	VoIP configuration
3	Data networking configuration
4	Firewall configuration
5	Traffic management configuration
6	VoIP survivability configuration

Some of the steps are optional depending on your particular application. We have provided configuration guidelines below for each of the application types supported by the 4300T.

Configuration Guide For IP Centrex Applications

A typical 4300T installation for an IP Centrex application requires no external router or firewall. The 4300T WAN port is connected directly to the T1/E1 line and the LAN port(s) are connected directly to enterprise devices and/or Ethernet switches.



VoIP signaling is performed in the service provider network via a softswitch and the 4300T acts as a proxy for the voice devices installed in the enterprise LAN. In this configuration a single public IP address is used to proxy for all of the IP phones and to route to multiple PC's installed on the LAN.

The 4300T performs the following functions in this application:

- WAN/LAN IP routing.
- Traffic shaping and priority queuing to guarantee high quality voice traffic. These mechanisms protect voice and data traffic from contending for the same network resources to guarantee low latency and the highest call quality possible for VoIP traffic. At the same time they ensure the best utilization of WAN bandwidth by enabling data traffic to burst up to full line rate in the absence of voice calls. Precedence is automatically given to traffic coming from IP phones and other devices using the 4300T's Application Layer Gateway function.

- NAT/PAT translation for IP phones and PC's. This allows a single public IP address to be used on the WAN link to represent all of the private IP addresses assigned to the LAN IP phones and PC's.
- Static NAT entries. This enables the customer to use a WAN public IP address for data servers (web, mail, ftp, etc.) connected behind the 4300T. These servers can then be configured with private IP addresses for additional security.
- A "VoIP" aware firewall. A full Layer 7 gateway for voice traffic and a stateful packet inspection firewall for data traffic.
- Call Admission Control (CAC). CAC uses a deterministic algorithm to decide when there are insufficient network resources available to adequately support new calls and then return the equivalent of a "fast busy" to new call requests.
- DHCP server and TFTP relay. These features are used to simplify and expedite the IP configuration of phones and PC's. This also includes VoIP signaling gateway information (MGCP, SIP, H.323 and SCCP).
- Call quality monitoring (using MOS, jitter, latency, packet loss and much more) and test tools.
- VoIP survivability. Provides call switching to an LAN based PSTN gateway during WAN outages.

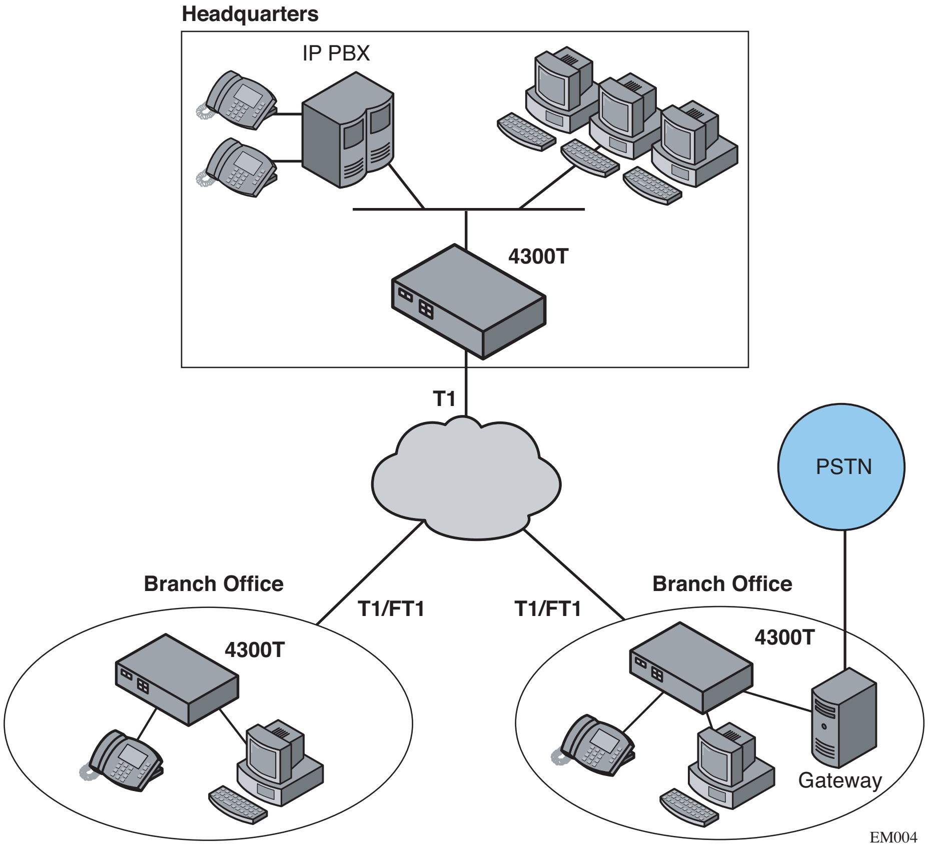
Configuration Outline

Task	Subtask	Configure For IP Centrex Application?
System Configuration	configure LAN/WAN interface	Yes
	set ethernet link rate	Optional
	enable the DHCP server	Optional but recommended
	configure SNMP	Optional
VoIP Configuration	enable the VoIP ALG	Yes
	configure a VoIP subnet route	Optional
Data Networking Configuration	dynamic NAT	Optional but recommended
	static NAT	Optional
	static IP routing	Optional
Firewall Configuration	enable the data firewall	Yes
	configure basic settings	Optional
	configure advanced settings	Optional

Traffic Management Configuration	enable traffic shaping	Yes
	enable Call Admission Control	Optional
VoIP Survivability	enable VoIP survivability	Yes
	configure call processing server reachability settings	Optional
	specify the number of digits to use for local dialing	Optional
	configure the IP address of the local LAN side PSTN gateway	Optional
	configure call processing server redundancy	Optional

Configuration Guide For Station Side IP PBX Applications

Most private enterprise VoIP networks use an IP PBX at the corporate headquarters location to provide voice switching between headquarters, branch offices and the PSTN. The 4300T is used in these environments to securely connect branch office employees to the IP PBX installed in the corporate headquarters location.



The installation of an 4300T on the station side of an enterprise IP PBX is very similar to the IP Centrex application above. The branch office is connected to the corporate network using a private T1/E1 link connected directly to the WAN port of the 4300T. The LAN port(s) of the 4300T are connected directly to enterprise devices and/or Ethernet switches.

The IP PBX in the corporate headquarters location performs VoIP signaling and the 4300T acts as a proxy for the voice devices installed at the branch office. Please note that in the configuration the 4300T located at the Headquarters location is acting as a WAN router only. The 4300Ts installed at the brand offices perform the following functions in this application:

- WAN/LAN IP routing.

- Traffic shaping and priority queuing to guarantee high quality voice traffic. These mechanisms protect voice and data traffic from contending for the same network resources to guarantee low latency and the highest call quality possible for VoIP traffic. At the same time they ensure the best utilization of WAN bandwidth by enabling data traffic to burst up to full line rate in the absence of voice calls. Precedence is automatically given to traffic coming from IP phones and other devices using the 4300T's Application Layer Gateway function.
- NAT/PAT translation for IP phones and PC's. This allows a single IP address to be used on the WAN link to represent all of the private IP addresses assigned to the LAN IP phones and PC's.
- A "VoIP" aware firewall. A full layer 7 gateway for voice traffic and a stateful packet inspection firewall for data traffic.
- Call Admission Control (CAC). CAC uses a deterministic algorithm to decide when there are insufficient network resources available to adequately support new calls and then return the equivalent of a "fast busy" to new call requests.
- DHCP server and TFTP relay. These features are used to simplify and expedite the IP configuration of phones and PC's. This also includes VoIP signaling gateway information (MGCP, SIP, H.323 and SCCP).
- Call quality monitoring and test tools.
- VoIP survivability. Provides call switching to an LAN based PSTN gateway during WAN outages.

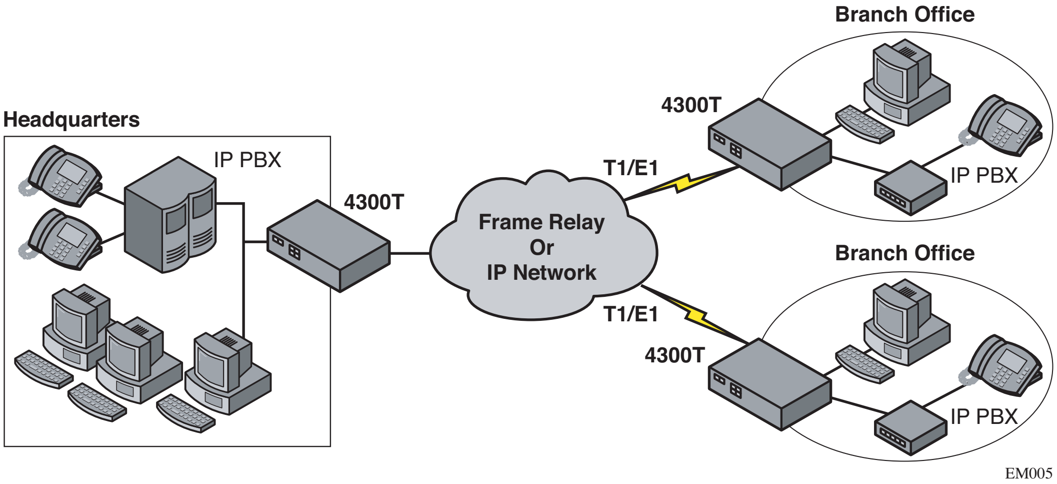
Configuration Outline

Task	Subtask	Configure For Station Side IP PBX Application?
System Configuration	configure LAN/WAN interface	Yes
	set ethernet link rate	Optional
	enable the DHCP server	Optional but recommended
	configure SNMP	Optional
VoIP Configuration	enable the VoIP ALG	Yes
	configure a VoIP subnet route	Optional
Data Networking Configuration	dynamic NAT	Optional but recommended
	static NAT	Optional

	static IP routing	Optional
Firewall Configuration	enable the data firewall	Yes
	configure basic settings	Optional
	configure advanced settings	Optional
Traffic Management Configuration	enable traffic shaping	Yes
	enable Call Admission Control	Optional
VoIP Survivability	enable VoIP survivability	Yes
	configure call processing server reachability settings	Optional
	specify the number of digits to use for local dialing	Optional
	configure the IP address of the local LAN side PSTN gateway	Optional
	configure call processing server redundancy	Optional

Configuration Guide For Trunk Side IP PBX Applications

Companies with existing IP-based WAN links for inter-office voice and data communications can use the 4300T as a traffic shaper to meet the stringent jitter, latency and packet loss requirements for toll quality voice. The 4300T is deployed at the edge of the WAN in both headquarters and branch office locations, as shown below.



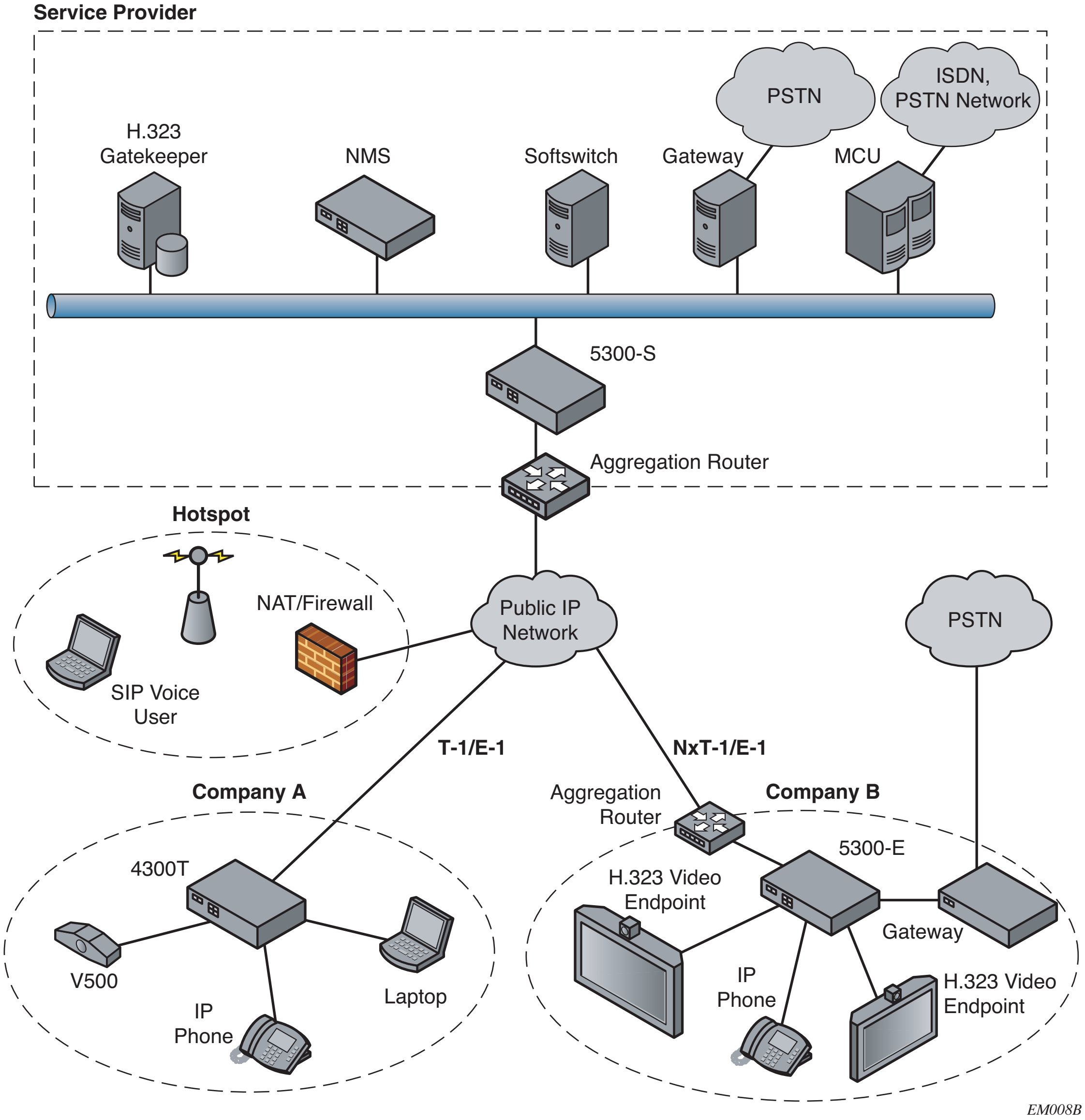
The 4300T performs WAN/LAN IP routing and traffic management functions in this application. In particular, it provides prioritization to ensure voice packets are not delayed or dropped while allowing data traffic to use all remaining bandwidth.

Configuration Outline

Task	Subtask	Configure For Trunk Side IP PBX Application?
System Configuration	configure LAN/WAN interface	Yes
	set ethernet link rate	Optional
	enable the DHCP server	Not required
	configure SNMP	Optional
VoIP Configuration	enable the VoIP ALG	Not required
	configure a VoIP subnet route	Not required
Data Networking Configuration	dynamic NAT	Not required
	static NAT	Not required
	static IP routing	Not required
Firewall Configuration	enable the data firewall	Not required
	configure basic settings	Not required
	configure advanced settings	Not required
Traffic Management Configuration	enable traffic shaping	Yes
	enable Call Admission Control	Not required

Configuration Guide For Hosted Video Applications

A typical 4300T installation for hosted video applications is depicted in the diagram below. In this scenario, the 4300Ts are used to connect all of the video endpoints to the Gatekeeper. The video endpoints should be configured to point to the LAN address of the 4300T as the Gatekeeper and the 4300T will proxy RAS and call setup messages to the Gatekeeper



The 4300T is installed at the customer premises and is used as a demarcation point for the video service by providing the following functions:

- WAN/LAN IP routing.

- Traffic shaping and priority queuing to guarantee high quality video traffic. These mechanisms protect video and data traffic from contending for the same network resources to guarantee low latency and the highest call quality possible for voice and video traffic. At the same time they ensure the best utilization of WAN bandwidth by enabling data traffic to burst up to full line rate in the absence of video calls. Precedence is automatically given to traffic coming from video endpoints and other devices using the 4300T's Application Layer Gateway function.

- Video NAT/PAT translation for video endpoints and PC's. This allows a single IP address to be used on the WAN link to represent all of the private IP addresses assigned to the LAN video endpoints and PC's.

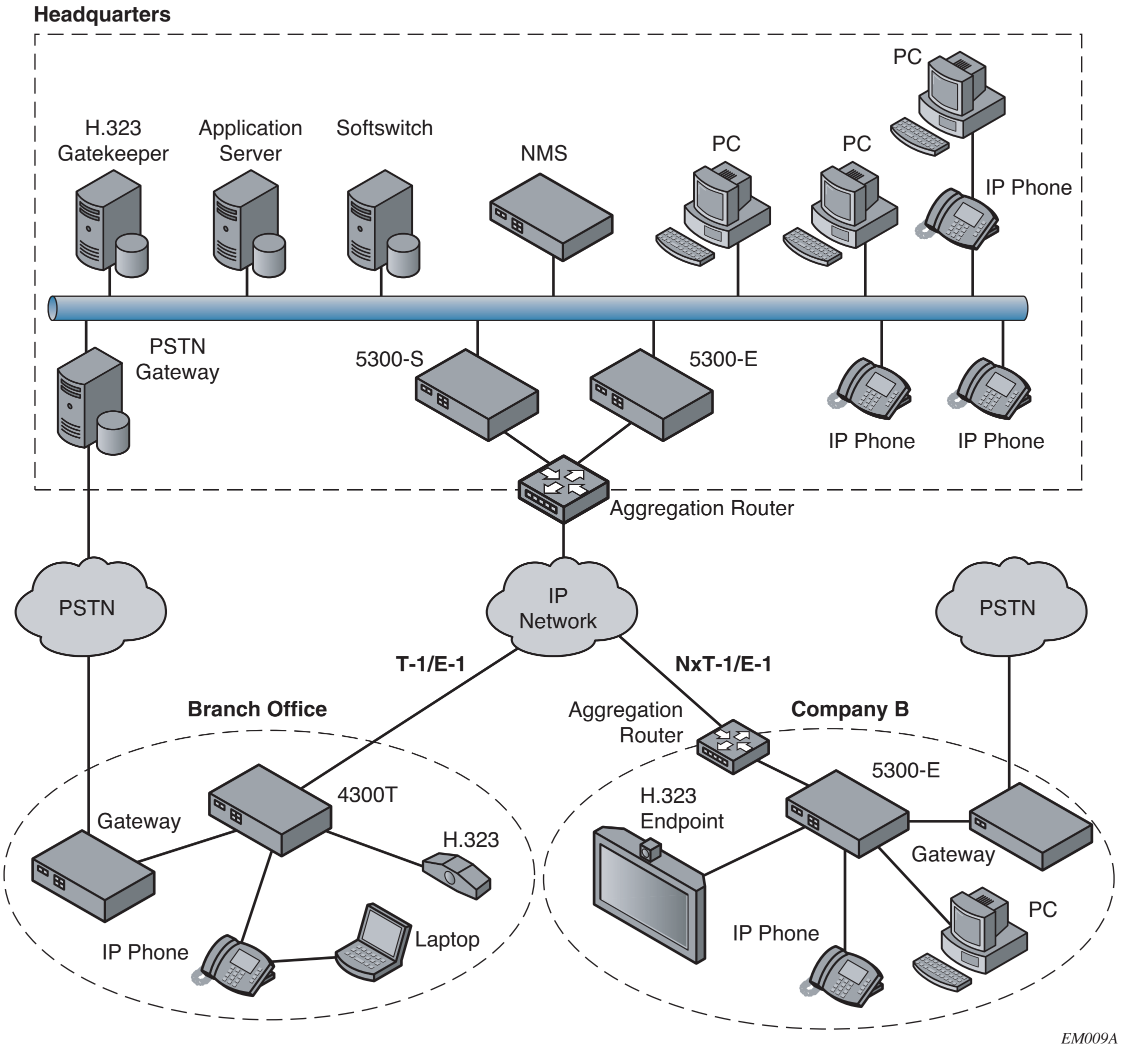
- A video aware firewall. A full layer 7 gateway for video traffic and a stateful packet inspection firewall for data traffic

- Call Admission Control (CAC). CAC uses a deterministic algorithm to decide when there are insufficient network resources available to adequately support new video calls and then return the equivalent of a "fast busy" to new call requests.

Task	Subtask	Configure For Hosted Video Applications?
System Configuration	configure LAN/WAN interface	Yes
	set ethernet link rate	Optional
	enable the DHCP server	Optional
	configure SNMP	Optional
VoIP Configuration	enable the VoIP ALG	Yes
	configure a VoIP subnet route	Optional
Data Networking Configuration	dynamic NAT	Optional but recommended
	static NAT	Optional
	static IP routing	Optional
Firewall Configuration	enable the data firewall	Yes
	configure basic settings	Optional
	configure advanced settings	Optional
Traffic Management Configuration	enable traffic shaping	Yes
	enable Call Admission Control	Optional

Configuration Guide For Enterprise Video Applications

A typical 4300T installation for enterprise video applications is depicted in the diagram below. In this scenario, the 4300Ts are used to connect all of the video endpoints to the Gatekeeper. The video endpoints should be configured to point to the LAN address of the 4300T as the Gatekeeper and the 4300T will proxy RAS and call setup messages to the Gatekeeper.



The 4300T is installed at the private/public IP address boundary and provides the following functions:

- WAN/LAN IP routing.
- Traffic shaping and priority queuing to guarantee high quality video traffic. These mechanisms protect video and data traffic from contending for the same network resources to guarantee low latency and the highest

call quality possible for voice and video traffic. At the same time they ensure the best utilization of WAN bandwidth by enabling data traffic to burst up to full line rate in the absence of video calls. Precedence is automatically given to traffic coming from video endpoints and other devices using the 4300T's Application Layer Gateway function.

- Video NAT/PAT translation for video endpoints and PC's. This allows a single IP address to be used on the WAN link to represent all of the private IP addresses assigned to the LAN video endpoints and PC's.
- A video aware firewall. A full layer 7 gateway for video traffic and a stateful packet inspection firewall for data traffic
- Call Admission Control (CAC). CAC uses a deterministic algorithm to decide when there are insufficient network resources available to adequately support new video calls and then return the equivalent of a "fast busy" to new call requests.

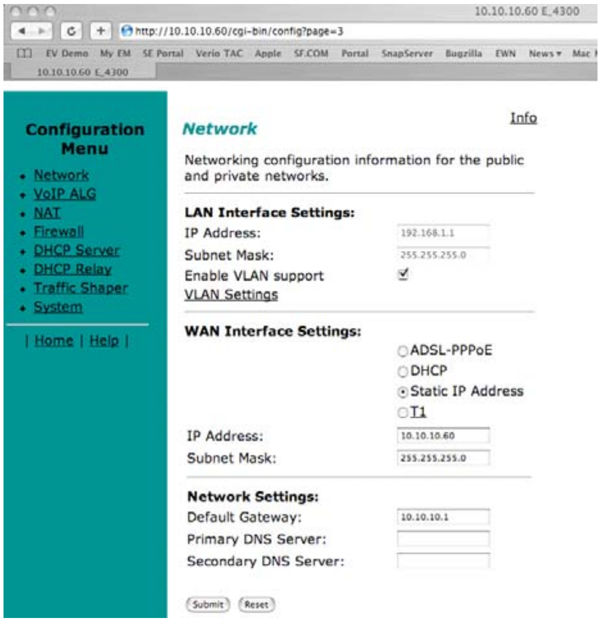
Task	Subtask	Configure For Hosted Video Applications?
System Configuration	configure LAN/WAN interface	Yes
	set ethernet link rate	Optional
	enable the DHCP server	Optional
	configure SNMP	Optional
VoIP Configuration	enable the VoIP ALG	Yes
	configure a VoIP subnet route	Optional
Data Networking Configuration	dynamic NAT	Optional but recommended
	static NAT	Optional
	static IP routing	Optional
Firewall Configuration	enable the data firewall	Yes
	configure basic settings	Optional
	configure advanced settings	Optional
Traffic Management Configuration	enable traffic shaping	Yes
	enable Call Admission Control	Optional

System Configuration

This section explains how to configure the 4300T to function in your IP network. You will configure the T1/E1 WAN interface, Ethernet interfaces, network addresses, DNS settings, default gateway, SNMP settings and change the administrative password.

1. Physically connect to the 4300T as described in Administration of the 4300T on page 2-2.

   A browser-based configuration GUI should appear, as shown here.



Network

Networking configuration information for the public and private networks.

LAN Interface Settings:

IP Address: 192.168.1.1

Subnet Mask: 255.255.255.0

Enable VLAN support ☑

VLAN Settings

WAN Interface Settings:

○ ADSL-PPPoE
○ DHCP
● Static IP Address
○ T1

IP Address: 10.10.10.60

Subnet Mask: 255.255.255.0

Network Settings:

Default Gateway: 10.10.10.1

Primary DNS Server:

Secondary DNS Server:

2. Select the Network entry in the Configuration Menu.

Configure the LAN Interface

The 4300T provides an integrated 4 port 10/100 Mbps ethernet switch that can be optionally configured to support 802.1q VLANs. Integrated VLAN support simplifies the integration of the 4300T with existing VLAN-based networks. The 4300T is able to receive 802.1q-tagged packets from a downstream VLAN switch and appropriately route and process them per its firewall rules. Packets received from the WAN are placed in the appropriate VLAN based on IP address routing.

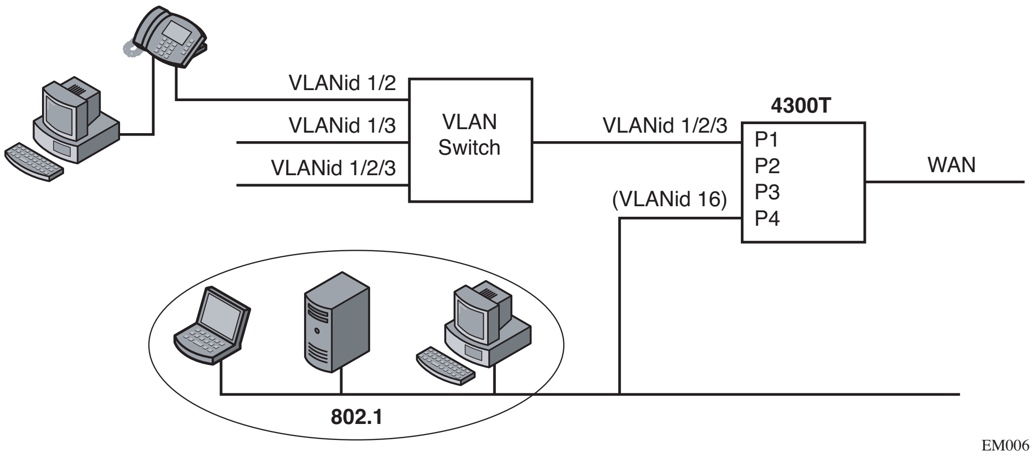
By default VLANs are not enabled and a single IP address is used for all 4 ethernet ports. The configuration of this address is as follows:

1. Enter the IP Address.
2. Enter the Subnet Mask (e.g. 255.255.255.0).

3. Press Submit.

Configuring VLANs in the 4300T

As depicted in the diagram below, VLANs are used to connect the 4300T to an Ethernet switch that has been configured to use VLANs.



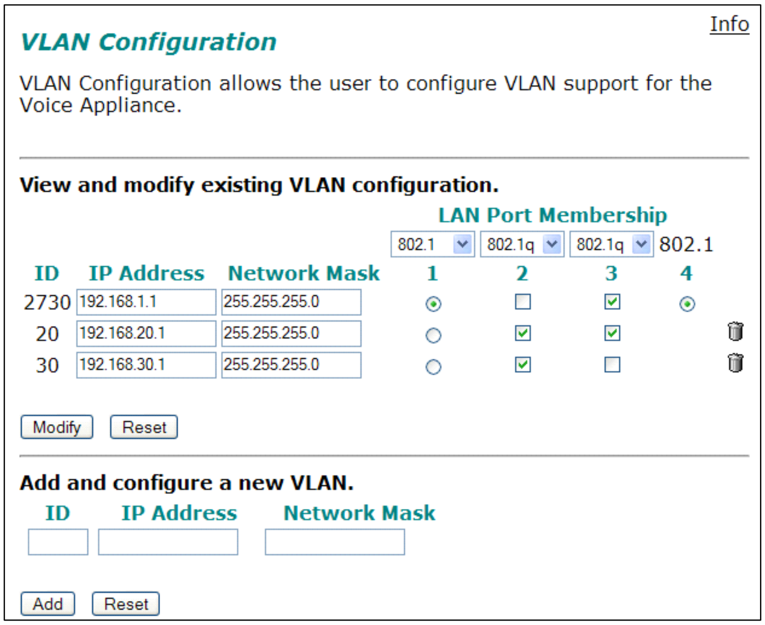
Typically, all VoIP devices are placed in the same VLAN while data devices are placed in a different VLAN. This is to ensure priority treatment of the VoIP traffic on the LAN. Note that the 4300T does not require VLANs to prioritize VoIP traffic; prioritization is determined by the VOS Application Layer Gateway, regardless of VLAN. Some important notes about VLANs:

- A physical LAN port will operate in either 802.1 or 802.1q mode, not both simultaneously
- The 4300T supports up to 16 VLANs
- A unique IP Subnet is assigned to each VLAN
- You can associate one or more VLANs to each LAN port operating in 802.1q mode
- Traffic within a VLAN is switched among all ports with membership
- Traffic between VLANs is routed by the 4300T
- The 4300T ALG can only be assigned to one VLAN id
  - Only ALG traffic is prioritized over the WAN
  - Other non-VoIP traffic in the same VLAN will not receive priority treatment
- A DHCP server can be enabled/disabled per VLAN
- Cisco Discovery Protocol is not supported

- 802.1p is not currently supported

1. Select the Network link.
2. Select Enable VLAN support.
3. Press Submit.

Caution Be careful when changing a port from 802.1 to 802.1q mode. Any 802.1 devices connected to that port (such as your management PC!) will loose access to the 4300T. Port 4 is only able to receive 802.1 frames, so a PC can always be connected to this port if the configuration of the other ports is unknown.



VLAN Configuration

VLAN Configuration allows the user to configure VLAN support for the Voice Appliance.

View and modify existing VLAN configuration.

			LAN Port Membership				
			802.1	802.1q	802.1q	802.1	
ID	IP Address	Network Mask	1	2	3	4	
2730	192.168.1.1	255.255.255.0	●	□	☑	●	
20	192.168.20.1	255.255.255.0	○	☑	☑		🗑
30	192.168.30.1	255.255.255.0	○	☑	□		🗑

Add and configure a new VLAN.

ID	IP Address	Network Mask

4. Select System.
5. Select VLAN Configuration.
6. Adjust LAN Port Membership drop-down boxes to specify 802.1 or 802.1q mode, as desired. Press Modify.

   If changing modes, the radio-buttons or checkboxes will change from one style to the other.
7. Under Add and configure a new VLAN enter a new VLAN ID, the 4300T's IP address within this VLAN, and the Network Mask. Press Add.

   A new VLAN entry will be added to the VLAN Configuration above.
8. Depending on the mode of a physical port, assign it to one or more VLANs:

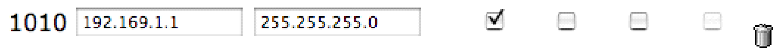
- 802.1 mode: Assign the port to any ONE VLAN.
- 802.1q mode: Assign the port to any number of VLANs

Perform steps 1 through 6 above for each VLAN you wish to create.

Modify an Existing VLAN Configuration

1. Select the Network link.
2. Select VLAN Settings.
3. Change the desired settings.
4. Press the Modify to modify the VLAN. The Reset button will restore the input area being modified to its previous value.

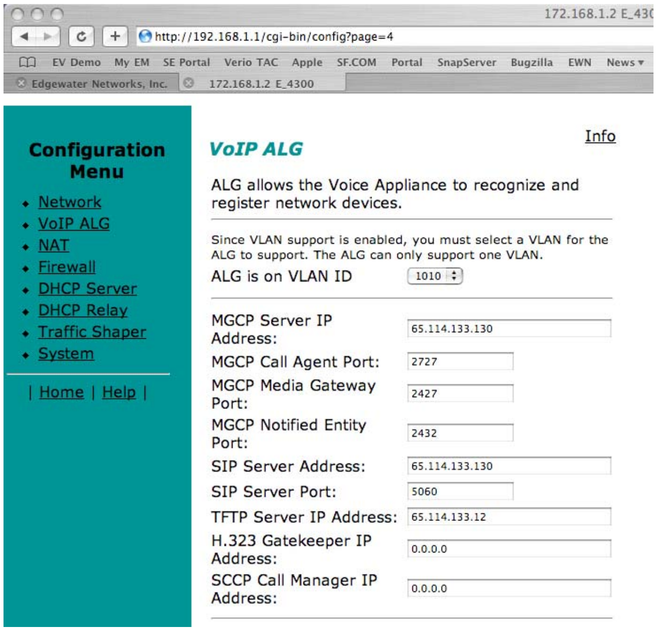
Delete an Existing VLAN Configuration



1010 | 192.169.1.1 | 255.255.255.0 | ☑ | □ | □ | □ | 🗑

1. Select the Network link.
2. Select VLAN Settings.
3. Press the trash can icon next to the VLAN you wish to delete.

Assign the 4300T's ALG to your Priority VLAN



VoIP ALG

ALG allows the Voice Appliance to recognize and register network devices.

Since VLAN support is enabled, you must select a VLAN for the ALG to support. The ALG can only support one VLAN.

ALG is on VLAN ID: 1010

MGCP Server IP Address:	65.114.133.130
MGCP Call Agent Port:	2727
MGCP Media Gateway Port:	2427
MGCP Notified Entity Port:	2432
SIP Server Address:	65.114.133.130
SIP Server Port:	5060
TFTP Server IP Address:	65.114.133.12
H.323 Gatekeeper IP Address:	0.0.0.0
SCCP Call Manager IP Address:	0.0.0.0

Once you have completed your VLAN configuration you must assign the 4300T ALG to the VLAN containing your VoIP phones.

1. Select the VoIP ALG from the main configuration menu.
2. Use the drop down menu to assign the ALG to the VLAN ID containing your VoIP phones.
3. Press Submit.

Configure the WAN Interface

The 10/100 Ethernet WAN port is configured as follows:

1. Select ADSL-PPPoE if you want to connect to Internet using ADSL and your ISP has given PPPoE username and password. Press Submit. You will be prompted to enter username and password, enter these and press Submit again.
2. Select DHCP if you want to get WAN side IP address using DHCP server available in WAN side of the network. Press Submit.
3. Select Static IP address if you want to manually assign the IP address configuration to the ethernet WAN interface.
4. Enter the IP Address.
5. Enter the Subnet Mask (e.g. 255.255.255.0).

6. Enter the Default Gateway. This is usually the upstream router's IP address. Packets destined for IP networks not known to the 4300T are forwarded to the default gateway for handling.
7. Enter the Primary DNS Server. The DNS server is used by the 4300T to resolve domain names to IP addresses. The value entered into this field is provided to IP devices that use the 4300T as a DHCP server. The 4300T VoIP ALG also uses it if domain names are used instead of IP addresses to identify signaling and/or TFTP servers (see the section entitled "Configuring the VoIP ALG" for more details).
8. Enter the Secondary DNS Server. This server will be used in the event that the primary DNS server is not reachable.
9. Press Submit.

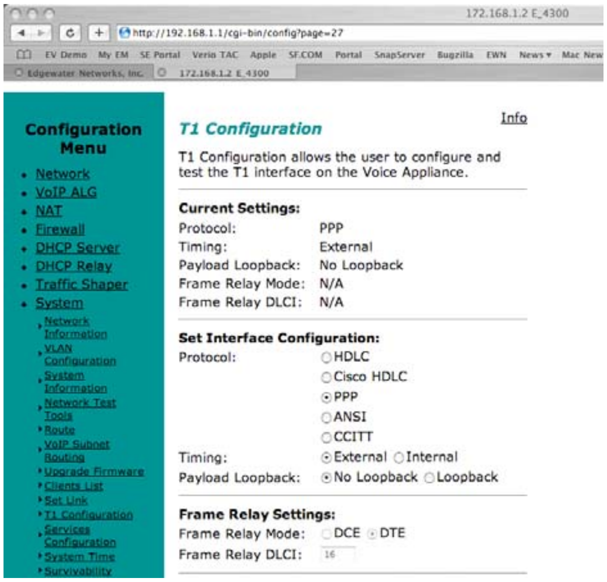
To enable the T1 interface:

1. Select Network.
2. Select the T1 radio button.
3. Select Submit.

To configure the T1 parameters:

1. Select Network.
2. Select the T1 link next to the radio button to proceed to the T1 Configuration page.

   The T1 Configuration menu will display, as shown here.



T1 Configuration

T1 Configuration allows the user to configure and test the T1 interface on the Voice Appliance.

Current Settings:

Protocol:	PPP
Timing:	External
Payload Loopback:	No Loopback
Frame Relay Mode:	N/A
Frame Relay DLCI:	N/A

Set Interface Configuration:

Protocol:	○ HDLC ○ Cisco HDLC ● PPP ○ ANSI ○ CCITT
Timing:	● External ○ Internal
Payload Loopback:	● No Loopback ○ Loopback

Frame Relay Settings:

Frame Relay Mode:	○ DCE ● DTE
Frame Relay DLCI:	16

The 4300T supports a wide range of T1/E1 Layer 2 configuration parameters. The specific values you will need must be supplied by the WAN provider.

Each of the 4300T's configurable parameters are described below.

Protocol

Display and set the T1 Layer 2 protocol. Supported protocols are:

- HDLC
- Cisco HDLC
- PPP
- ANSI (Frame Relay)
- CCITT (Frame Relay)

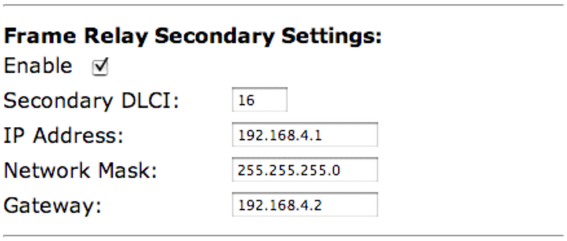
1. Select the desired T1 protocol.
2. Press Submit.

Frame Relay Mode and DLCI

When the Protocol is one of ANSI or CCITT, then additional Frame Relay configuration parameters are required.

The Frame Relay Mode is usually set to DTE for the customer premises.

The Frame Relay DLCI is set by the WAN provider and identifies the far-end device across the Frame Relay network. This DLCI can also be used to carry voice traffic only by enabling the Secondary DLCI for data.



Frame Relay Secondary Settings:

Enable ☑

Secondary DLCI:	16
IP Address:	192.168.4.1
Network Mask:	255.255.255.0
Gateway:	192.168.4.2

Most installations will use a single DLCI for both voice and data traffic. However, in instances where the network will provide a different quality of service based on DLCI number it is desirable to place all voice traffic on one DLCI and then configure a second DLCI for data. In this case, the Secondary DLCI is configured as follows:

1. Select Network.
2. Select the T1 link next to the radio button to proceed to the T1 configuration page.
3. Select Enable in the Frame Relay Secondary Settings section of the page.
4. Enter the Secondary DLCI, IP Address, Network Mask and Gateway for the data traffic using the Secondary DLCI.

Timing

Display and set the clock timing source for the T1/E1 interface. The timing can be either derived from the network (External) or provided to the T1 interface by the V²IU (Internal). With a carrier-provided T1, the timing is usually derived from the network (External, the default setting).

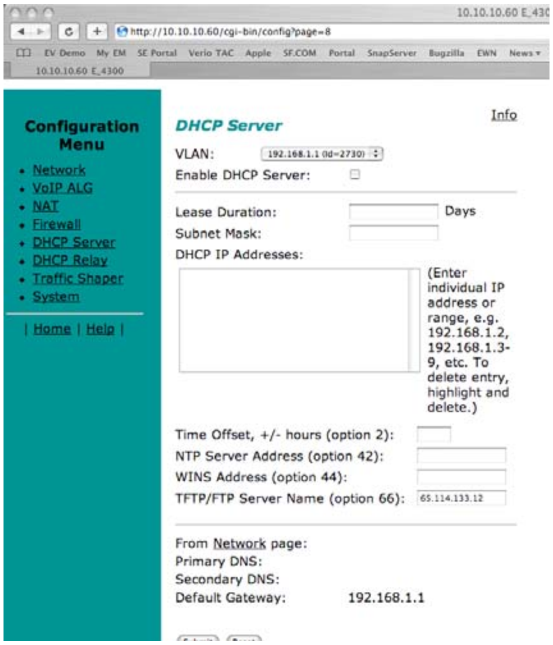
Warning

Mismatched timing modes can result in WAN connectivity but with intermittent data loss.

Payload Loopback

Display and set the loopback setting. During T1 line testing the local interface can be set to Loopback to allow the network provider to verify connectivity and line quality. For normal operation the setting should always be No Loopback (the default setting).

Configure the DHCP Server



DHCP Server

VLAN: 192.168.1.1 (id=2730)

Enable DHCP Server: □

Lease Duration: Days

Subnet Mask:

DHCP IP Addresses: (Enter individual IP address or range, e.g. 192.168.1.2, 192.168.1.3-9, etc. To delete entry, highlight and delete.)

Time Offset, +/- hours (option 2):

NTP Server Address (option 42):

WINS Address (option 44):

TFTP/FTP Server Name (option 66): 65.114.133.12

From Network page:

Primary DNS:

Secondary DNS:

Default Gateway: 192.168.1.1

The 4300T can act as a DHCP server granting IP addresses to PCs, workstations, servers or voice devices (IP phones, IADs or softphones) connected to its LAN interfaces. DHCP is a protocol that enables IP devices to obtain temporary or permanent IP addresses (out of a pool) from centrally administered servers.

The user can configure blocks of IP addresses, a default gateway, DNS servers, NTP server address, Time offset from NTP value, WINS address and TFTP/FTP server name that can be served to the requesting IP devices.

In addition the 4300T will provide its LAN IP address in DHCP user options 150 and 151 for use by IP phones. Some IP phones use these values for configuration of their TFTP server and MGCP control server addresses.

Note

> The DHCP server in the 4300T should not be used if a DHCP server already exists in the same subnet as the 4300T. Also, it is recommended that you assign static IP addresses for common-access devices such as network printers or fax machines.

You can also enable or disable the 4300T DHCP server on a per VLAN basis.

1. Select DHCP Server.
2. If you are using VLANs select the desired VLAN ID from the drop down menu.
3. The default value for the DHCP server is disabled. Click the top checkbox to enable or disable the internal DHCP server (default is disabled). If you are using VLANs select the desired VLAN ID.
4. Enter the Lease Duration.

   The lease duration is the amount of time in days that an IP device may use an assigned IP address before requesting that it be renewed. The default value is 7 days and the valid range of input is 1 to 30 days.
5. Enter the Subnet Mask.

   This is the subnet mask that will be sent via DHCP to the requesting IP devices.
6. Enter the DHCP IP Addresses.

   This is the pool of IP addresses that will be provided to the requesting IP devices. You can enter both individual IP addresses or a range of addresses using the following format:

   192.168.1.2 (single address)

   192.168.1.4-10 (address range 192.168.1.4 through 192.168.1.10)

Note

> The range format can only be used for class C addresses (those with a subnet mask of 255.255.255.0).

7. Enter the Time Offset (DHCP user option 2).
8. Set the time offset in hours from UTC for your local location. This value is optional; if supplied, it will be delivered to clients.
9. Enter the NTP Server Address (DHCP user option 42).

   This is the IP address of a Network Time Server. This value is optional; if supplied, it will be delivered to clients.
10. Enter the WINS Address.

Note If you are not using WINS leave this field blank.

The Windows Internal Naming Service (WINS) is a service that keeps a database of computer name-to-IP address mappings so that computer names used in Windows environments can be mapped to IP addresses. The WINS Address is the IP address of the WINS server in your network. This value will be delivered to clients.

1. Enter the TFTP/FTP Server Name (DHCP user option 66).

   Some IP phones use this setting to locate the TFTP or FTP servers which contain the phone software image used during boot. By default this option is the same as the TFTP server on the VoIP ALG page.

2. Primary and Secondary DNS

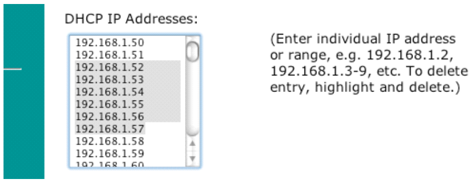
   The primary and secondary DNS values come from those set under the WAN interface configuration, see Configure the WAN interface. These values will be delivered to clients.

3. Default Gateway

   The default gateway is automatically set to the 4300T's LAN address, see Configure the LAN interface. This value will be delivered to clients.

4. Press Submit.

Delete a DHCP IP Address



DHCP IP Addresses:

192.168.1.50
192.168.1.51
192.168.1.52
192.168.1.53
192.168.1.54
192.168.1.55
192.168.1.56
192.168.1.57
192.168.1.58
192.168.1.59
192.168.1.60

(Enter individual IP address or range, e.g. 192.168.1.2, 192.168.1.3-9, etc. To delete entry, highlight and delete.)

1. Select DHCP Server.
2. To delete an IP address or a range of IP addresses highlight an entry or range of entries in the DHCP IP Addresses list and press the Delete key on your keyboard.
3. Press Submit.

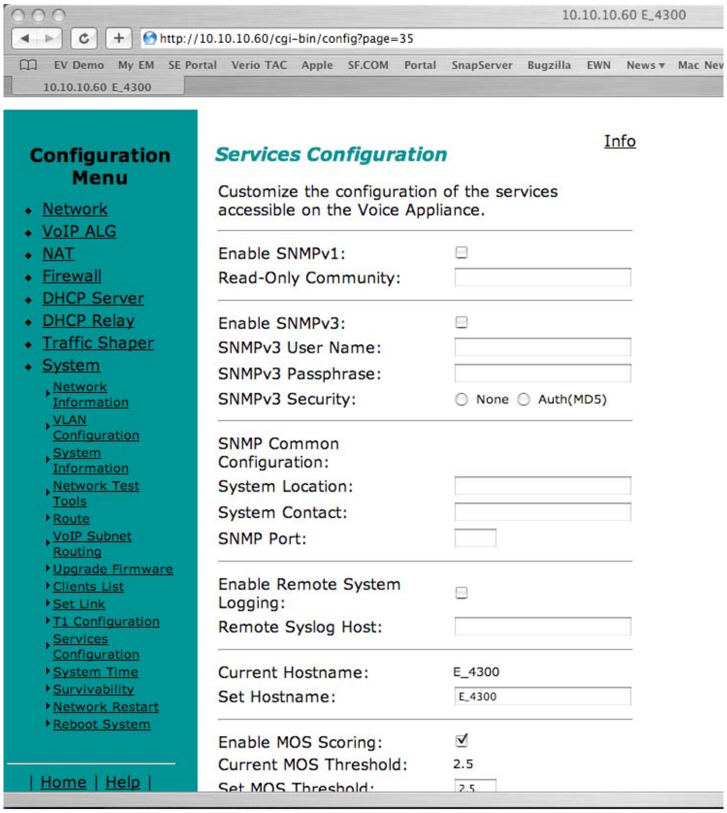
Disable The DHCP Server

1. Select DHCP Server.
2. Uncheck the Enable DHCP Server checkbox.

3. Press Submit.

Configure Hostname, SNMP and Remote Logging

The 4300T can be managed remotely by an SNMP network management system such as HP Openview. The 4300T supports SNMPv1 or SNMPv3 and MIB-II (RFC1213). All MIB-II variables are read only. The MIB variables sysContact and sysLocation are set by the web GUI.



Services Configuration

Customize the configuration of the services accessible on the Voice Appliance.

Enable SNMPv1: □
Read-Only Community:

Enable SNMPv3: □
SNMPv3 User Name:
SNMPv3 Passphrase:
SNMPv3 Security: ○ None ○ Auth(MD5)

SNMP Common Configuration:
System Location:
System Contact:
SNMP Port:

Enable Remote System Logging: □
Remote Syslog Host:

Current Hostname: E_4300
Set Hostname: E_4300

Enable MOS Scoring: ☑
Current MOS Threshold: 2.5
Set MOS Threshold: 2.5

Messages generated by the 4300T can be sent to a remote log server.

The configuration screen is reached through the Configuration Menu:

1. Select System.
2. Select System Overview.
3. Select Services Configuration.

Configure SNMP

1. Select the Enable SNMP v1 or v3 checkbox. If using SNMPv1 enter the Read-Only Community. If using SNMPv3 enter the User Name, Passphrase and Security method.
2. Enter the System Location.

   This is a comment string that can be used to indicate the physical location of the 4300T. By default, no value is set.
3. Enter the System Contact.

   This is the administrative contact information for the 4300T. By default, no value is set.
4. Enter the SNMP Port.

   This is the port that the 4300T uses for SNMP communications with the network management system. The default is 161.
5. Press Submit.

Disable SNMP

1. Select System.
2. Select System Overview.
3. Select Services Configuration.
4. Uncheck the Enable SNMP checkbox.
5. Press Submit.

Configure Remote System Logging

The 4300T can be configured to log system messages to an external syslog server.

1. Select the Enable Remote System Logging checkbox.
2. Enter the IP address of the Remote Syslog Host.

   By default messages are sent to the remote host on port 514. This port can be changed by using the syntax ADDRESS:PORT.
3. Press Submit.

Disable Remote System Logging

1. Select System.
2. Select System Overview.
3. Select Services Configuration.

4. Uncheck the Enable Remote System Logging checkbox.
5. Press Submit.

Configure a local Hostname

A locally configured hostname is useful for remote management. This name can appear as the identifier string for the 4300T on a system management console.

>> Enter a **host name** in the field provided.

Enable Mean Opinion Scoring (MOS)

The 4300T produces useful statistics on a per call basis that can be written to syslog. These include MOS, jitter, latency, packet loss and much more.

1. Select System.
2. Select System Overview.
3. Select Services Configuration.
4. Select Enable MOS.

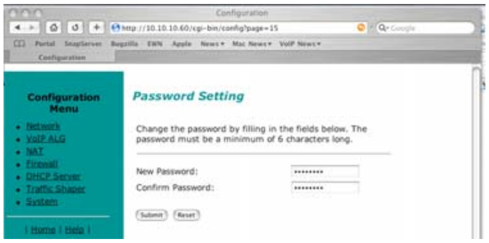
Set MOS Threshold

You can define a minimum MOS value in the 4300T such that a message will be sent to syslog when the measured MOS value drops below the minimum. This is useful when for monitoring a particular location for call quality problems and enables pro-active resolution of problems that negatively affect call quality.

1. Select System.
2. Select System Overview.
3. Select Services Configuration.
4. Enter the minimum MOS threshold in the Set MOS threshold field.
5. Press Submit

Change the Administration Password

We strongly recommend that you change the default password for the root administrative account using the following steps:



Password Setting

Change the password by filling in the fields below. The password must be a minimum of 6 characters long.

New Password: ••••••••

Confirm Password: ••••••••

Note The new password must be between 6 and 20 characters in length. Any combination of alpha and numeric characters is accepted.

1. Enter the password you chose in step C again in the Confirm Password to ensure that there were no mistakes in the initial entry.
2. Press Submit.

VoIP Configuration

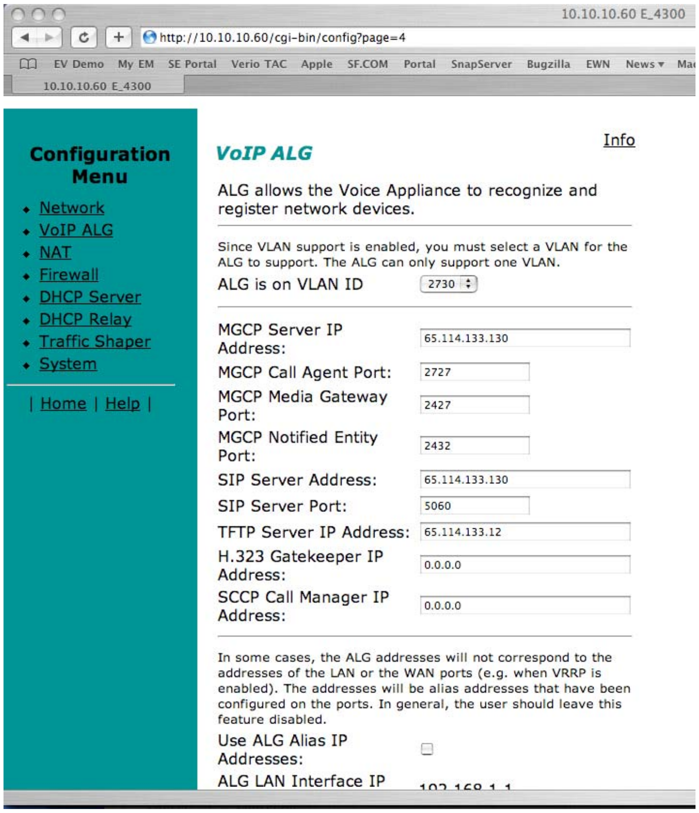
The 4300T provides a VoIP application layer gateway (ALG) for the SIP, MGCP, and H.323 protocols. The ALG proxies the connection between the VoIP softswitch, IP PBX or gatekeeper and voice and video devices such as IP phones, IADs or softphones. By acting as a proxy the 4300T is able to provide several important functions for IP based voice and video:

- Provide NAT/PAT services for voice and video traffic. NAT/PAT for VoIP enables you to use a single public IP address on the WAN interface of the 4300T to represent multiple private IP addresses assigned to voice or video devices on the LAN. The NAT function maps both IP address and IP port number between the public and private addresses so that all signaling and VoIP media packets are translated. A single public IP address can support up to 253 voice and video devices.
- Provide security services for voice and video traffic.
  - NAT/PAT services hide enterprise LAN topology from hackers.
  - The ALG acts as a “voice and video aware” firewall and ensures only authenticated voice traffic enters the enterprise LAN. This is accomplished by the dynamic provisioning of signaling and media ports for authenticated voice devices. The implementation is stateful and open ports are closed automatically when no longer required to support the voice or video call.

- Enable mobility in the enterprise LAN for voice devices. This is useful, for example, when using WiFi or moving office locations. In these instances the IP address of the voice and video device may be changed.

Configure the VoIP ALG

In order to configure the VoIP ALG the 4300T must be told where to reach the signaling servers and TFTP server on behalf of the voice devices.



VoIP ALG

ALG allows the Voice Appliance to recognize and register network devices.

Since VLAN support is enabled, you must select a VLAN for the ALG to support. The ALG can only support one VLAN.

ALG is on VLAN ID 2730

MGCP Server IP Address: 65.114.133.130

MGCP Call Agent Port: 2727

MGCP Media Gateway Port: 2427

MGCP Notified Entity Port: 2432

SIP Server Address: 65.114.133.130

SIP Server Port: 5060

TFTP Server IP Address: 65.114.133.12

H.323 Gatekeeper IP Address: 0.0.0.0

SCCP Call Manager IP Address: 0.0.0.0

In some cases, the ALG addresses will not correspond to the addresses of the LAN or the WAN ports (e.g. when VRRP is enabled). The addresses will be alias addresses that have been configured on the ports. In general, the user should leave this feature disabled.

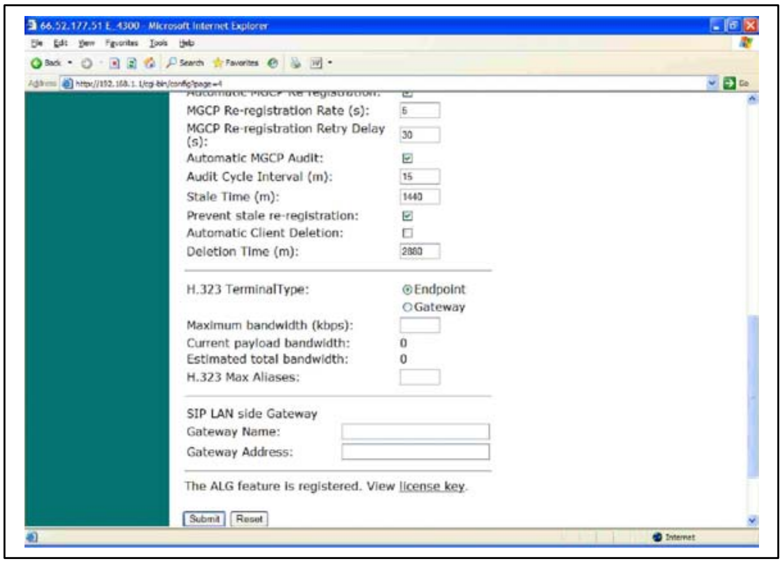
Use ALG Alias IP Addresses: □

ALG LAN Interface IP 192.168.1.1

1. Select VoIP ALG.
2. If using VLANs assign the ALG to a specific VLAN id using the drop down menu.
3. If you are using MGCP enter the MGCP Server IP Address, MGCP Media Gateway Port and MGCP Notified Entity Port.
4. If you are using SIP enter the SIP Server IP Address and SIP server port. The SIP server port is the port used by the SIP registrar. The default value is port 5060.
5. If you are using H.323 enter the H.323 Gatekeeper IP Address.

6. Enter the TFTP Server Address. This address is used to identify the TFTP server that contains the images used by IP phones at boot up. The 4300T performs a TFTP server relay function.

Note It is not necessary to program in an FTP server address if your IP phones use the FTP protocol instead of TFTP to retrieve their images. A relay function is not needed for FTP as the 4300T will forward FTP traffic to the destination server as programmed in your IP phone.


66.52.177.51 E_4300 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://192.168.1.1/cgi-bin/config?page=4
Go
Internet

MGCP Re-registration Rate (s): 5
MGCP Re-registration Retry Delay (s): 30
Automatic MGCP Audit: ☑
Audit Cycle Interval (m): 15
Stale Time (m): 1440
Prevent stale re-registration: ☑
Automatic Client Deletion: □
Deletion Time (m): 2880

H.323 TerminalType: ● Endpoint ○ Gateway
Maximum bandwidth (kbps):
Current payload bandwidth: 0
Estimated total bandwidth: 0
H.323 Max Aliases:

SIP LAN side Gateway
Gateway Name:
Gateway Address:

The ALG feature is registered. View license key.

Submit Reset

7. Automatic MGCP Re-registration is used to re-register MGCP endpoints every time the network or system restarts. Enable this feature to automatically synchronize the softswitch and phones immediately after a restart. The default is Enabled.

8. The MGCP Re-registration Rate is used to set the number of MGCP RSIP messages to send per second to the Media Gateway Controller when re-registration is needed. If the MGCP Re-registration Rate needs to be changed, enter a value between 1 and 5. Generally, this value does not need to be modified. The default value is 5 msg/second.

9. The system re-registers clients when it starts up. If any of these re-registration requests fail, the system will wait for the configured number of seconds and then retry the re-registration for the clients that failed. The system will make at most 10 re-registration requests for failed attempts. If the MGCP Re-registration Retry Delay needs to be changed, enter a value between 30 and 60 seconds. Generally, this value does not need to be modified. The default value is 30 seconds.

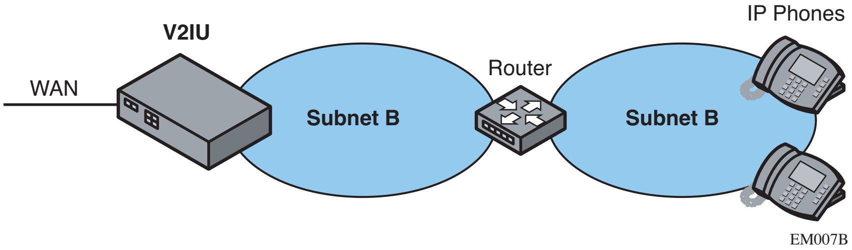
10. The H.323 TerminalType is used to specify the type of terminal that the Voice Appliance should use. It can be either endpoint or gateway. The Maximum Bandwidth specifies the bandwidth to allow for H.323 calls.

The bandwidth is specified in kbps and if it is set to 0, bandwidth management is not enforced. Only calls with media traversing the 4300T is counted towards the bandwidth maximum.

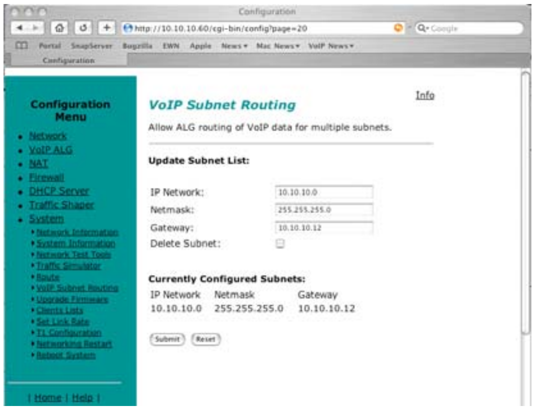
11. The Current payload bandwidth calculates the current video traffic, without IP overhead, traversing the Appliance. The Estimated total bandwidth calculates the total video traffic, plus IP overhead, traversing the Appliance.
12. The H.323 Max Aliases limits the number of aliases that are allowed to register with the Voice Appliance. If this number is exceeded when a client tries to register, the registration will be rejected. If the value is set to 0, the maximum is not enforced.
13. The SIP LAN Side Gateway is used to configure a LAN side SIP gateway to which calls that are not for a registered phone can be sent. The name of the gateway is the name that is configured for the gateway in the soft-switch and the IP address is the address where the gateway can be reached.
14. Press Submit.

Configure VoIP Subnet Routing

It is not necessary to configure VoIP subnet routing if all of your voice and video devices are installed on the same IP subnet as the 4300T. In some installations the voice and video devices are located in different subnets than the 4300T and connected via intermediate routers. In these instances it is necessary to configure a return path in the 4300T by specifying the intermediate router who knows how to reach the voice devices. This router must be reachable by the 4300T.



Note VoIP Subnet Routing is separate and independent from static data routes (see Static IP routing). VoIP subnet routes must be configured for each LAN subnet that contains devices making use of the 4300T's Application Layer Gateway (ALG). These entries tell the ALG that the identified subnet is allowed to make use of its services and what router the ALG should use to reach that subnet.



VoIP Subnet Routing

Allow ALG routing of VoIP data for multiple subnets.

Update Subnet List:

IP Network: 10.10.10.0
Netmask: 255.255.255.0
Gateway: 10.10.10.12
Delete Subnet: □

Currently Configured Subnets:

IP Network	Netmask	Gateway
10.10.10.0	255.255.255.0	10.10.10.12

Enter a VoIP Subnet Route

1. Select System.
2. Select System Overview.
3. Select VoIP Subnet Routing.
4. Enter the IP Network (e.g. 10.10.12.0).

   This is the IP address of the remote subnet containing the voice devices.
5. Enter the **Netmask** (e.g. 255.255.255.0).

   This is the mask of the IP address of the subnet containing the voice devices.
6. Enter the **Gateway** (e.g. 10.10.10.2).

   This is the IP address of the intermediate router that knows the return path to the remote subnet from the 4300T.
7. Press **Submit**.

Perform steps 1 through 7 for each remote subnet containing the voice devices.

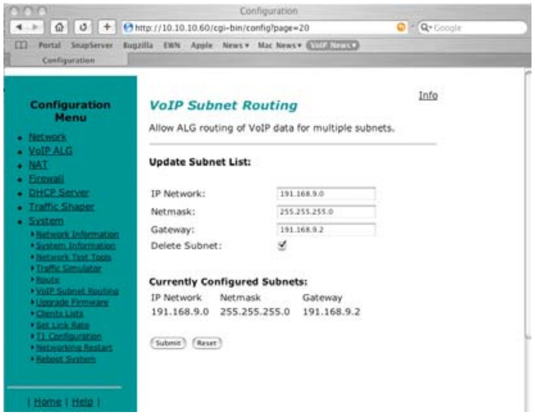
Note The 4300T is limited to a total of 20 different VoIP subnets.

Delete a VoIP Subnet Route

1. Select System.

2. Select System Overview.
3. Select VoIP Subnet Routing.
4. Enter the IP Network (e.g. 10.10.12.0) .

   This is the IP address of the remote subnet containing the voice devices.



VoIP Subnet Routing

Allow ALG routing of VoIP data for multiple subnets.

Update Subnet List:

IP Network: 191.168.9.0
Netmask: 255.255.255.0
Gateway: 191.168.9.2
Delete Subnet: ☑

Currently Configured Subnets:

IP Network	Netmask	Gateway
191.168.9.0	255.255.255.0	191.168.9.2

5. Enter the Netmask (e.g. 255.255.255.0).

   This is the mask of the IP address of the subnet containing the voice devices.

6. Enter the Gateway (e.g. 10.10.10.2) .
7. This is the IP address of the intermediate router that knows the return path to the remote subnet from the 4300T.
8. Select the Delete Subnet checkbox.
9. Press Submit.

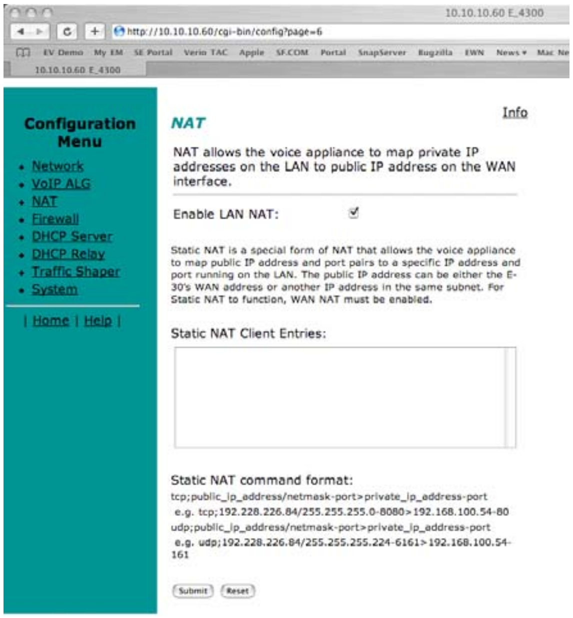
Perform steps 1 through 8 for each remote subnet that you wish to delete.

Configure IP Phones, IADs or Softphones

After configuring the 4300T VoIP ALG the voice devices must be configured to point to the LAN interface of the 4300T as their signaling gateway and optionally as their TFTP server (if they use the TFTP protocol to retrieve their software images). The steps required to setup these devices differ from vendor to vendor. Using the DHCP server included in the 4300T will significantly simplify the setup of these devices if they are able to obtain their IP configuration via DHCP. Please consult the applicable users guide of each device for detailed instructions.

Data Networking Configuration

The 4300T provides static IP routing and two types of Network Address Translation (NAT) functions for data traffic. This section describes the use and configuration of these features.



NAT

NAT allows the voice appliance to map private IP addresses on the LAN to public IP address on the WAN interface.

Enable LAN NAT: ☑

Static NAT is a special form of NAT that allows the voice appliance to map public IP address and port pairs to a specific IP address and port running on the LAN. The public IP address can be either the E-30's WAN address or another IP address in the same subnet. For Static NAT to function, WAN NAT must be enabled.

Static NAT Client Entries:

Static NAT command format:

```
tcp;public_ip_address/netmask-port>private_ip_address-port
 e.g. tcp;192.228.226.84/255.255.255.0-8080>192.168.100.54-80
udp;public_ip_address/netmask-port>private_ip_address-port
 e.g. udp;192.228.226.84/255.255.255.224-6161>192.168.100.54-
161
```

NAT for Data Traffic

NAT allows hosts on a private internal network (the LAN side of the 4300T) to anonymously communicate with devices on an external network (the WAN side of the 4300T). The 4300T with NAT enabled will re-write outbound packet headers using public IP addresses in place of private IP addresses so that the private IP addresses are not exposed to the external network. Additionally, the ports used by the IP addresses are also changed as they traverse the 4300T. This is known as Port Address Translation (PAT) and provides an additional security measure. The 4300T maintains a table of these mappings so that return packets can be forwarded to the correct host on the private network.

The 4300T provides two types of NAT functions: dynamic NAT and static NAT. Dynamic NAT allows many private IP addresses to be mapped to a single public IP address (using different port numbers of the public IP address). Static NAT maps private IP addresses and port. For example, mapping a public IP address to a specific machine on the private network responsible for receiving email.

Note The 4300T ALG automatically handles NAT for voice devices.

Configure Dynamic NAT

Use Dynamic NAT when you have multiple PCs installed on the LAN side of the 4300T that require Internet or WAN access. Once Dynamic NAT is enabled the 4300T will automatically perform an address translation for all packets to/from the LAN side PCs.

1. From the Configuration Menu select NAT.
2. Use the Enable Lan NAT checkbox to enable or disable dynamic NAT.

   The default value for dynamic NAT is enabled.
3. Press Submit.

Configure Static NAT

Use Static NAT when a server or PC located in the private network needs to be accessible from the external network. Some examples include a corporate web server, a mail server or an FTP server. In these instances, the 4300T statically maps the public IP address of each server to the actual private IP address of the server.

Note In order for Static NAT to function dynamic NAT must be enabled.

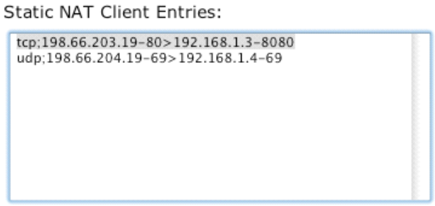
1. Select **NAT**.
2. Enter the public and private IP addresses and ports to be mapped in ***Static NAT Client Entries*** using the following format:

   ```
   Protocol;PublicIPAddress/netmask-port>PrivateIPAddress-port
   ```

   For example, the entry “tcp;198.66.203.19-80>192.168.1.3-8080” will map all web traffic destined to public IP address 198.66.203.19 to the private webserver 192.168.1.3 port 8080. The public IP address of 198.66.203.19 is automatically created as a “subinterface” or “secondary address” on the WAN interface of the 4300T so that external hosts can reach the web server.

   Each entry should be placed on a new line.
3. Press **Submit**.

Delete a Static NAT entry



Static NAT Client Entries:

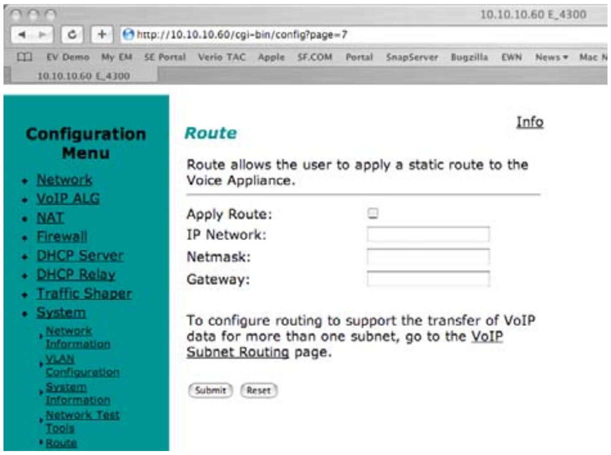
```
tcp;198.66.203.19-80>192.168.1.3-8080
udp;198.66.204.19-69>192.168.1.4-69
```

1. Select NAT.
2. To delete an IP address or a range of IP addresses highlight the entry in the Static NAT Client Entries list and press the Delete key on your keyboard.
3. Press Submit.

Static IP routing

In addition to locally connected IP networks the 4300T can forward traffic for a remote data network by configuring a static route entry. Any packets destined for the remote data network will be forwarded to the specified gateway address in the entry.

Configure the static route



Route

Route allows the user to apply a static route to the Voice Appliance.

Apply Route: □

IP Network:

Netmask:

Gateway:

To configure routing to support the transfer of VoIP data for more than one subnet, go to the VoIP Subnet Routing page.

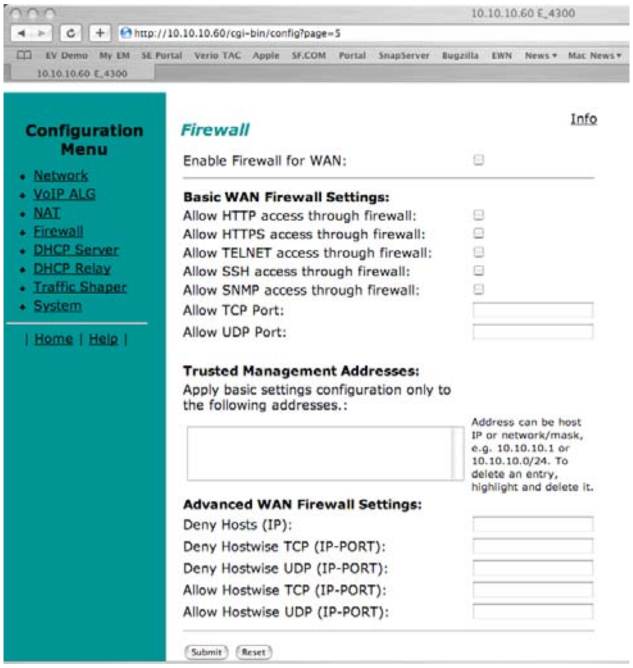
1. Select System.
2. Select System Overview.
3. Select Route.

4. Select the Apply Route checkbox.
5. Enter the IP Network address. This address is the remote data network you would like the 4300T to forward to the gateway. The hosts portion of the IP address should be set to "0". For example, 10.10.20.0
6. Enter the Netmask of the remote data network. For example, 255.255.255.0
7. Enter the Gateway IP address of the interface that will receive all packets destined for the remote data network.
8. Press Submit.

Delete the static route

1. Select System.
2. Select System Overview.
3. Select Route.
4. Remove the check in the Apply Route checkbox.
5. Press Submit.

Firewall Configuration



Firewall

Enable Firewall for WAN: □

Basic WAN Firewall Settings:

Allow HTTP access through firewall: □

Allow HTTPS access through firewall: □

Allow TELNET access through firewall: □

Allow SSH access through firewall: □

Allow SNMP access through firewall: □

Allow TCP Port:

Allow UDP Port:

Trusted Management Addresses:

Apply basic settings configuration only to the following addresses.:

Address can be host IP or network/mask, e.g. 10.10.10.1 or 10.10.10.0/24. To delete an entry, highlight and delete it.

Advanced WAN Firewall Settings:

Deny Hosts (IP):

Deny Hostwise TCP (IP-PORT):

Deny Hostwise UDP (IP-PORT):

Allow Hostwise TCP (IP-PORT):

Allow Hostwise UDP (IP-PORT):

The 4300T uses a Stateful Packet Inspection (SPI) firewall to protect data devices installed behind the LAN interface. Voice devices are protected by the 4300T Application Layer Gateway (ALG) as described in ***VoIP Configuration***.

The firewall is enabled by default. The default behavior of the firewall is to:

- deny all traffic originating from the WAN
- allow all traffic originating from the LAN
- allow only return traffic for connections that originated from the LAN
- deny all traffic originating from the WAN to the 4300T itself
- allow all traffic originating from the LAN to the 4300T

The default behavior can be modified using the basic and advanced settings fields on the firewall configuration page. We recommend that you use the 4300T firewall, however it can be disabled if the 4300T is installed behind an existing legacy firewall.

Enable or disable the firewall

1. Select **Fire**wall.
2. Use the Enable Firewall checkbox to either enable or disable the firewall.
3. Select Submi**t**.

Configure Basic settings

To allow or deny HTTP, Telnet and SSH traffic originating from the WAN to the 4300T simply use the checkboxes provided in the basic settings area of the firewall configuration page. By default, access from the WAN into the 4300T is disabled.

Warning

> Denying HTTP, Telnet or SSH traffic from the WAN may result in losing management connectivity to the 4300T if you are configuring the system remotely using the WAN link.

1. Select Firewall.
2. Use the three Allow access from WAN side checkboxes to enable or disable HTTP, Telnet, and/or SSH access from IP devices on the WAN side of the 4300T.
3. Select Submit.

Configure Advanced Settings

A comprehensive security policy can be created using the advanced settings of the 4300T firewall. The policy actions that can be taken on any packet processed by the 4300T are summarized in the following table:

Action	Description	Input format
Allow TCP Port	Allows traffic with the specified TCP port to terminate on the 4300T.	*Valid values range from 1 through 65535. *Multiple entries are separated by a space *Range value specified by : character. For example, 25:50 means perform the action on ports 25 through 50
Allow UDP Port	Allows traffic with the specified UDP port to terminate on the 4300T.	*Valid values range from 1 through 65535. *Multiple entries are separated by a space *Range value specified by : character. For example: 25:50 means perform the action on ports 25 through 50
Deny Hosts (IP)	Denies all traffic with the source IP address matching the specified hosts	*Multiple entries are separated by a space *Classful IP addresses are assumed by default. For example: 192.168.3.1 uses a class c mask. Subnets can be specified using the / notation. E.g. 192.168.3.1/24
Deny Hostwise TCP (IP-Port)	Denies all traffic matching the specified TCP port numbers **and** the specified **source** IP addresses	*Multiple entries are separated by a space *Port are specified using a - character. For example: 192.168.3.1-23 for Telnet. *Port ranges are specified using a : character. For example: 192.168.3.1-23:50 means port 23 through 50 *Classful IP addresses are assumed by default. For example: 192.168.3.1 uses a class c mask. Subnets can be specified using the / notation. E.g. 192.168.3.1/24
Deny Hostwise UDP (IP-Port)	Denies all traffic matching the specified UDP port numbers **and** the specified **source** IP addresses	*Multiple entries are separated by a space *Port are specified using a - character. For example: 192.168.3.1-23 for Telnet. *Port ranges are specified using a : character. For example: 192.168.3.1-23:50 means port 23 through 50 *Classful IP addresses are assumed by default. For example: 192.168.3.1 uses a class c mask. Subnets can be specified using the / notation. E.g. 192.168.3.1/24
Allow Hostwise TCP (IP-Port)	Allows all traffic matching the specified TCP port numbers **and** the specified **source** IP addresses	*Multiple entries are separated by a space *Port are specified using a - character. For example: 192.168.3.1-23 for Telnet. *Port ranges are specified using a : character. For example: 192.168.3.1-23:50 means port 23 through 50 *Classful IP addresses are assumed by default. For example: 192.168.3.1 uses a class c mask. Subnets can be specified using the / notation. E.g. 192.168.3.1/24

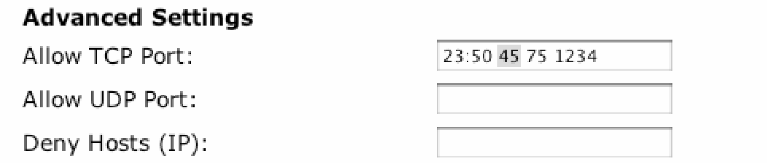
Allow Hostwise UDP (IP-Port)	Allows all traffic matching the specified UDP port numbers **and** the specified **source** IP addresses	*Multiple entries are separated by a space *Port are specified using a - character. For example: 192.168.3.1-23 for Telnet. *Port ranges are specified using a : character. For example: 192.168.3.1-23:50 means port 23 through 50 *Classful IP addresses are assumed by default. For example: 192.168.3.1 uses a class c mask. Subnets can be specified using the / notation. E.g. 192.168.3.1/24

If a given packet does not match any of the configured rules, it is dropped.

1. Select Firewall.
2. Enter the desired Advanced Settings using the table above as a guide.
3. Select Submit.

Remove Advanced Setting Entries

To remove an advanced firewall setting simply highlight the value in the entry box and delete it using the keyboard.



Advanced Settings

Allow TCP Port: 23:50 45 75 1234

Allow UDP Port:

Deny Hosts (IP):

1. Select Firewall.
2. Highlight the entry to be deleted in the Advanced Settings list and press the Delete key on your keyboard.
3. Press Submit.

Traffic Management Configuration

Traffic management is required to ensure high quality voice and video calls when voice, video, and data traffic share the same WAN link. Voice and video traffic must be prioritized for transmission over data traffic to meet the stringent jitter, latency and packet loss requirements for high quality voice and video. The 4300T:

- Automatically prioritizes voice and video traffic over data traffic to ensure high quality voice and video calls.
- Maximizes WAN link utilization by allowing data traffic to burst up to full line rate in the absence of voice and video calls.

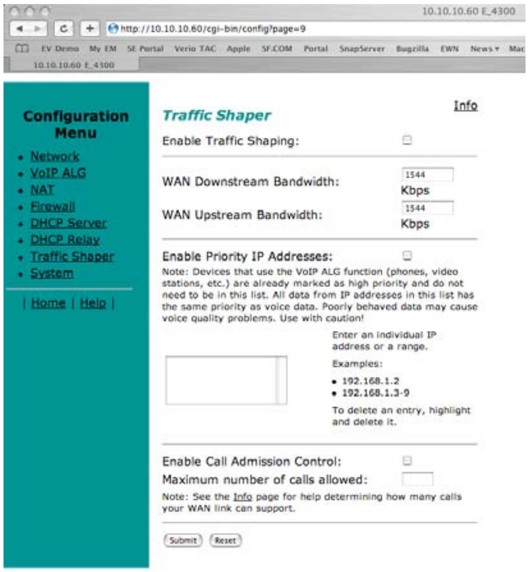
- Controls the data transfer rate of far-end WAN TCP devices to limit WAN link congestion.
- Supports network-based QoS applications by setting the TOS bits for all VoIP packets sent to the WAN and the LAN. TOS bits are used so that VoIP packets can be prioritized in the network by DiffServ enabled routers. The TOS bit value used by the 4300T is to "minimize delay and maximize throughput", or 0xb8 hexadecimal. This value is set for all VoIP packets processed by the 4300T and overwrites any specific TOS bit configuration set by VoIP endpoints.
- Ensures that bandwidth allocated to new voice and video calls does not adversely affect the quality of existing active calls (Call Admission Control or CAC).

The 4300T combines sophisticated traffic management mechanisms including classification, prioritization, queuing, rate limiting and CAC to ensure high quality voice and video calls. Fortunately the system manages this complexity for you and configuring traffic management is very straightforward:

1. Enable traffic shaping.
2. Specify the upstream and downstream bandwidth of your WAN link.
3. Enable CAC.

Please follow the steps below to configure and enable traffic management.

Enable Traffic Shaping



Traffic Shaper

Enable Traffic Shaping: □

WAN Downstream Bandwidth: 1544 Kbps

WAN Upstream Bandwidth: 1544 Kbps

Enable Priority IP Addresses: □

Note: Devices that use the VoIP ALG function (phones, video stations, etc.) are already marked as high priority and do not need to be in this list. All data from IP addresses in this list has the same priority as voice data. Poorly behaved data may cause voice quality problems. Use with caution!

Enter an individual IP address or a range.

Examples:

- 192.168.1.2
- 192.168.1.3-9

To delete an entry, highlight and delete it.

Enable Call Admission Control: □

Maximum number of calls allowed:

Note: See the Info page for help determining how many calls your WAN link can support.

1. From the Configuration Menu, select Traffic Shaper.
2. Select the Enable traffic shaper checkbox.

3. Specify the upstream and downstream bandwidth of your WAN link
4. Enter the WAN Downstream Bandwidth in Kbps.
5. Enter the WAN Upstream Bandwidth in Kbps.

Note For FT1/T1/E1 links the upstream and downstream bandwidths will always be the same value (the link is full-duplex).

Optionally enable priority IP addresses

VoIP traffic from devices that use the VoIP ALG function (phones, video stations, softphones on Pcs, etc.) are already marked as high priority and **do not** need to be manually configured in this list. This list is used to prioritize voice traffic from trunk interfaces of IP PBXs or other high priority devices that do not use the VoIP ALG function of the 4300T.

>> Enter the IP address of other high priority devices in the priority IP Addresses box.

You can enter individual IP addresses or a range using by appending a "-" character to the last octet. For example, 10.10.10.2-5 would specify 10.10.10.2, 10.10.10.3, 10.10.10.4 and 10.10.10.5 as voice devices.

Warning Care must be taken to ensure that the IP addresses entered do not include data devices such as PCs or workstations. Traffic from these devices will be placed in the priority voice queue internal to the 4300T and burst up to full line rate. This will starve actual voice devices by consuming priority bandwidth and result in dropped calls, busy signals & poor voice quality.

Enable CAC

The 4300T uses CAC to limit the number of active voice calls over the WAN link. This is necessary because a typical installation uses a ratio of 1:2 or 1:4 active voice calls to voice devices on the assumption that 50% or 25% of all users are on the phone at the same time. These ratios are guidelines only and at times the number of concurrent calls may exceed the amount of WAN bandwidth available to process the calls. In this instance existing phone calls will experience poor quality or be dropped all together. To prevent this from occurring a typical voice installation will set a threshold for the maximum number of concurrent voice calls supported by the WAN access link. New call requests in excess of this threshold will receive the equivalent of a "fast busy" and the WAN link will not become oversubscribed.

For IP Centrex installations the maximum number of concurrent voice calls is usually configured in the 4300T by enabling CAC. When the 4300T is deployed in IP PBX applications the maximum number of concurrent calls could be configured in the IP PBX. If the PBX is responsible for this setting you do not need to configure CAC in the 4300T. Please check with your IT administrator to determine if this is the case.

Determining the maximum number of concurrent calls

The maximum number of concurrent calls that can be supported by the WAN access link is calculated using the following formula:

Max calls = (Maximum WAN upstream bandwidth * .85)/VoIP codec rate

where,

Maximum WAN upstream bandwidth = value entered in step D above (in Kbps)

VoIP codec rate = 85.6Kbps for G.711 voice devices or 29.6Kbps for G.729 voice devices.

The maximum WAN upstream bandwidth is multiplied by .85 in the formula above to reduce the total bandwidth available for voice calls by 15%. This reduction is necessary because the 4300T automatically reserves 15% of the total WAN bandwidth for low priority data traffic so that it is not starved completely. Starving data traffic completely would increase the number of retry attempts and exacerbate congestion on the link during periods of peak usage.

Examples

The maximum number of G.711 voice calls supported by a T1 (1.536 Kbps) WAN is calculated as follows:

(1.536*.85)/85.6 = 15.3 or 15 total voice calls.

The maximum number of G.711 voice calls supported by a 768Kbps fractional T1 WAN is calculated as follows:

(768*.85)/85.6 = 7.6 or 7 total voice calls

The maximum number of G.729 voice calls supported by a 256Kbps fractional T1 WAN is calculated as follows:

(256*.85)/29.6 = 7.4 or 7 total voice calls

After determining the maximum number of voice calls CAC is enabled as follows:

1. Select the Enable Call Admission Control checkbox.
2. Enter Maximum number of calls allowed as calculated above.
3. Press Submit.

A Closer Look at Traffic Management in the 4300T

The traffic management mechanisms provided by the 4300T are designed to ensure high priority real-time voice and video traffic is processed before lower priority data traffic. At the same time, bandwidth not in use by voice and video traffic is made available so that data traffic can burst up to full line rate making efficient use of WAN bandwidth. Traffic management mechanisms are applied to traffic in both the upstream (LAN to WAN) and downstream (WAN to LAN) direction. Each direction is independent of the other and can support different size priority queues.

Classifying

High priority voice and video traffic generated by endpoint devices is automatically identified by the V^{2}IU's VoIP Application Layer Gateway. Other VoIP devices (not making use of the ALG) can be defined as high-priority by their IP address. The user configures these addresses into the priority list in the Traffic Shaper section of the 4300T web GUI.

As the 4300T processes packets they are identified as either high or low priority based on this configuration. Packets identified as high priority are marked as such in the TOS bits of their IP header, allowing prioritization by downstream routers. The TOS field is set to 12 hexadecimal "minimize delay and maximize throughput" This value overwrites any prior value.

Upstream Traffic Management

The 4300T appliance uses a combination of Class Based Queuing and simple classless queuing to send data in the upstream direction. The Class Based Queue (CBQ) consists of two priority classes (high and low), a scheduler to decide when packets need to be sent, and a traffic shaper to rate-limit by delaying packets before they are sent. Each of these is described in more detail below.

Priority classes

Voice and video traffic is placed in the high-priority queue and data traffic is placed in the low-priority queue. The IP header TOS field of packets in the high-priority queue is set to "minimize delay and maximize throughput".

Scheduler

High-priority data is polled before low priority data, thereby minimizing the latency for voice and video traffic. High-priority data is allowed to use up to 85% of the total WAN bandwidth. Although preferential treatment is given to high-priority data, 15% of the WAN link is always reserved so that low-priority data is not starved.

High priority data is polled before lower priority data to reduce overall latency for voice traffic.

Traffic shaper

To smooth bursts from high speed data links (typically from the LAN Ethernet heading to the WAN) the 4300T appliance uses a buffer that clocks data out at rates not exceeding automatically-calculated maximums. Low-priority data is clocked out at the WAN link's full rate LESS the bandwidth currently being used for high-priority (ie voice) data. High-priority data is clocked out at the WAN's full link rate. Any long-lasting burst condition in low-priority data will cause these packets to be delayed and, if necessary, dropped.

Downstream Traffic Management

Since the 4300T is the final transmitting device for WAN traffic in the upstream direction (LAN to WAN) it is easy to see how its QoS mechanisms can be applied to traffic it is transmitting to guarantee sufficient bandwidth for voice traffic. We have control over how packets are handed to the WAN interface.

In the downstream direction (WAN to LAN) we are installed at the receiving end of a service provider link and therefore have no control over the amount of voice or data traffic being sent to us over the WAN interface. How then can we still guarantee the quality of in-bound voice traffic when it is entirely possible for an FTP session, for example, to consume the vast majority of downstream bandwidth?

Fortunately this is possible by shaping on both the egress LAN and egress WAN ports of the 4300T appliance and leveraging the congestion avoidance mechanisms built into TCP. Essentially, data packets received by the 4300T's WAN interface at a rate that exceeds the T1's bandwidth LESS the bandwidth used for active voice calls are delayed (then dropped if necessary) before being forwarding on to its LAN interface. Similarly, data traffic sent back to the 4300T for transmission to the WAN are also delayed (as described in the above section). This results in the WAN-based devices following the rules of TCP/IP congestion avoidance and slowing down their transmit rate. This technique is quite effective in practice, as end stations usually reduce their transmit rate before VoIP signaling has completed for new call setup.

For example consider the scenario where there are no voice calls over a WAN link and multiple FTP sessions are consuming all available bandwidth:

1. A new call request is received by the 4300T from the WAN.
2. All signaling messages for the call are classified as voice traffic and therefore prioritized for transmission to the LAN before servicing the inbound FTP data.
3. RTP traffic (the voice data within an ongoing VoIP session) is similarly classified as voice traffic and treated with priority.
4. FTP data is buffered (or dropped) by the 4300T and return data, including the FTP ACKs, are also delayed. This results in a throttling of the transmit rate by the (far-end) FTP hosts, reducing overall WAN bandwidth consumption.

Generally, excessive UDP traffic must be shaped in the service provider network, as UDP does not provide congestion avoidance mechanisms. The exception to this is in the case of RTP UDP-based messages for voice traffic.

Although RTP makes use of UDP the 4300T appliance is able to provide its own congestion avoidance mechanism for voice traffic using Call Admission Control (CAC).

VoIP Survivability Configuration

The high availability of voice services is a fundamental requirement for enterprises deploying their own IP telephony equipment or subscribing to hosted VoIP services. In both cases providing reliable communications to remote branch offices is costly usually involving the installation of local call processing servers or additional wide area network (WAN) links to these locations.

Polycom's VoIP survivability enhances the reliability of VoIP services to branch offices in a cost effective manner by providing local call switching in the event of WAN link failures or a loss of connectivity to network based call processing servers. VoIP survivability is an orderable software option for Polycom's V^{2}IU Series appliances. V^{2}IU appliances are flexible networking devices that can also be configured to provide IP routing, optional T1 WAN link termination, resolve NAT/firewall traversal problems, ensure high quality voice using QoS, monitor voice call quality and provide comprehensive security for the LAN using a VoIP and data firewall.

Key benefits and features of VoIP survivability

Polycom's VoIP survivability offers the following important benefits:

- Continuity of voice services to branch offices during WAN link failures or failures in network based call processing servers
- Significant savings over alternative solutions requiring redundant call processing servers or multiple WAN links
- Simplified design that is easier to manage than alternative solutions requiring maintenance of multiple dial plans in distributed call processing servers and complex routing

Survivability features:

- Application layer based monitoring of call processing servers to determine connectivity
- Automatic detection of loss of connectivity to call processing servers caused by WAN link failures, network congestion or call processing server software failure
- Automatic return of call control to network based call processing servers once connectivity has been restored
- Configurable timers to determine call processing server connectivity

- Call processing server connectivity status indicators
- Support for multiple call processing servers using DNS
- Reporting of the currently active call processing server in environments using multiple call processing servers
- Local call switching between VoIP endpoints and premises based PSTN gateways during WAN link failures or other failures that prevent connectivity to network based call processing servers
- Calling features such as transfer, hold and conference are provided by V^{2}IU Series appliances
- Simplified setup that creates a local dial plan in the V^{2}IU appliance by monitoring traffic to network based call processing servers

How survivability works

The V^{2}IU appliance automatically creates a local dialing plan by monitoring the registration requests sent by LAN based SIP user agents as they register with the network based call processing server. In creating this dial plan the V^{2}IU appliance now has knowledge of all local SIP user agents installed on its LAN interface. This dial plan will be used during fallback mode of operation when the V^{2}IU appliance provides local call switching between user agents and/or a LAN side PSTN gateway.

V^{2}IU appliances continuously monitor the status of connectivity to network based call processing servers using application layer heartbeat messages. Configuration settings in V^{2}IU appliances control how often messages are sent to the call processing server and how quickly the server will be declared unreachable in the event of a failure. The use of application layer messages provides the added benefit of detecting the failure condition where an V^{2}IU appliance has IP connectivity to the call processing server but the call processing server software itself is not functioning properly.

Once a call processing server has been declared unreachable V^{2}IU appliances enter fallback mode and perform call processing for local SIP user agents. A SIP PSTN gateway can also be installed at the branch office on the LAN side of the V^{2}IU appliance and used for inbound and outbound calling during fallback mode. To maximize utilization of this gateway it can also be used when call switching is being performed by the network based call processing server.

Once connectivity to the network based call processing server is restored the V^{2}IU appliance will automatically turn control of all subsequent call requests over to the softswitch. Calls in progress that were established while the V^{2}IU appliance was in fallback mode will not be disrupted when connectivity is restored to the network based call processing server.

Redundant or multiple call processing servers can be used in conjunction with V^{2}IU Series appliances to further enhance the availability of voice services. V^{2}IU appliances will use DNS SRV records from a DNS server to obtain a prioritized list of available network based call processing servers. The V^{2}IU appliance using periodic messages monitors each server and the highest priority server that is currently reachable will be used for call processing. This feature can also be used to load balance or distribute calls among multiple servers however state replication is required by the call processing servers to provide full redundancy.

Platform Support

V^{2}IU Converged Network Appliances

- 4300T Series
- 5300 Series
- 6400 Series

IP Phones

- Polycom IP500 & IP600
- Cisco

PSTN Gateways

- Audiocodes MP-104/108

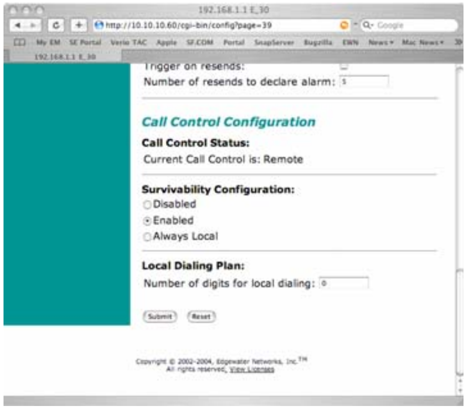
Configuring VoIP Survivability in V^{2}IU Appliances

Configuring VoIP survivability in V^{2}IU appliances consists of the following tasks:

1. Enable VoIP survivability.
2. Configure call processing server reachability settings (optional).
3. Specify the number of digits to use for local dialing (optional).
4. Configure the IP address of the local LAN side PSTN gateway (optional).
5. Configure call processing server redundancy (optional).

Please note that this configuration requires that you have completed the basic installation of the V^{2}IU appliance including interface, IP, traffic management and VoIP configurations. Information regarding these tasks can be found in the “info” section of the V^{2}IU appliance, or the User Manual.

Step 1 – Enable VoIP Survivability



Trigger on resends: □

Number of resends to declare alarm: 5

Call Control Configuration

Call Control Status:

Current Call Control is: Remote

Survivability Configuration:

○ Disabled

● Enabled

○ Always Local

Local Dialing Plan:

Number of digits for local dialing: 0

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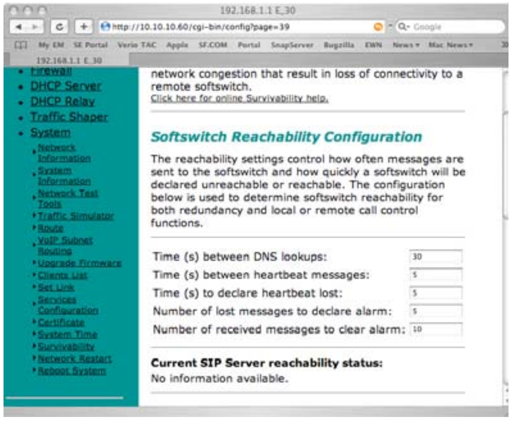
1. Log into the V²IU appliance using a Netscape or Internet Explorer web browser.
2. Select System.
3. Select Survivability.
4. Select the Enabled radio button under the Survivability Configuration section of the web page.
5. Press Submit.

The V²IU appliance is now configured to check the connectivity of the call processing server and will automatically perform local call switching if the server becomes unavailable.

Step 2 – Configure call processing server reachability settings (optional)



network congestion that result in loss of connectivity to a remote softswitch.
Click here for online Survivability help.

Softswitch Reachability Configuration

The reachability settings control how often messages are sent to the softswitch and how quickly a softswitch will be declared unreachable or reachable. The configuration below is used to determine softswitch reachability for both redundancy and local or remote call control functions.

Time (s) between DNS lookups:	30
Time (s) between heartbeat messages:	5
Time (s) to declare heartbeat lost:	5
Number of lost messages to declare alarm:	5
Number of received messages to clear alarm:	10

Current SIP Server reachability status:

No information available.

The reachability settings control how often messages are sent to network based call processing servers and how quickly a server will be declared unreachable or reachable. These settings can be changed to match the particular needs of your environment by using the following steps:

1. Log into the V²IU appliance using a Netscape or Internet Explorer web browser.
2. Select System.
3. Select Survivability.
4. Enter the desired values for Time between heartbeat messages, Time to declare heartbeat lost, Number of lost messages to declare alarm and Number of received messages to clear alarm in the Softswitch Reachability section of the web page.
5. Press Submit.

The reachability settings are used to determine when the V²IU appliance provides local call switching by entering fallback mode and when it returns call control to network based call processing servers. The definitions of the reachability settings are as follows:

Time between heartbeat messages - The number of seconds between each heartbeat message sent to the call processing servers to determine connectivity.

Time to declare heartbeat lost – The number of seconds that the V²IU appliance will wait before declaring a response to a heartbeat message lost.

Number of lost messages to declare alarm - the number of consecutively lost responses to heartbeat messages required for the V²IU appliance to declare a loss of connectivity to the network based call processing server.

Number of received messages to clear alarm - the number of consecutively received responses to heartbeat messages required for the V²IU Appliance to declare successful connectivity to the network based call processing server.

The formula used to determine the maximum time for the V²IU appliance to declare a loss of connectivity to a call processing server is: maximum time = (X * Y) + Z, where,

X = Time between heartbeat messages

Y = Number of lost messages to declare alarm

Z = Time to declare a heartbeat lost

The default value for X, Y and Z in the V²IU appliance is 5. Therefore, the default maximum time to declare a call processing server unreachable is 30 seconds or ((5*5) + 5).

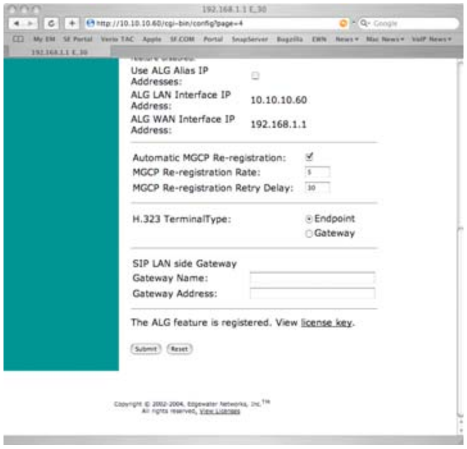
Step 3 - Specify the number of digits to use for local dialing

This field is the number of digits that the V²IU appliance will use for dialing when providing local call switching. By default the V²IU appliance will use 4, 7 and 10 digit dialing. Please follow the steps below if you would like to use a different number of digits:

1. Log into the V²IU appliance using a Netscape or Internet Explorer web browser.

2. Select System.
3. Select Survivability.
4. Enter the number of digits for local dialing in the Local Dial Plan section of the web page.
5. Press Submit.

Step 4 - Configure the IP address of the local LAN side PSTN gateway (optional)



192.168.1.1 E_30
http://10.10.10.60/cgi-bin/config?page=4
Google
My EM SE Portal Verio TAC Apple SF.COM Portal SnapServer Bugzilla EWN News▾ Mac News▾ VoIP News▾

Use ALG Alias IP Addresses:	□
ALG LAN Interface IP Address:	10.10.10.60
ALG WAN Interface IP Address:	192.168.1.1
Automatic MGCP Re-registration:	☑
MGCP Re-registration Rate:	5
MGCP Re-registration Retry Delay:	30
H.323 TerminalType:	● Endpoint ○ Gateway
SIP LAN side Gateway	
Gateway Name:	
Gateway Address:	

The ALG feature is registered. View license key.

Submit
Reset
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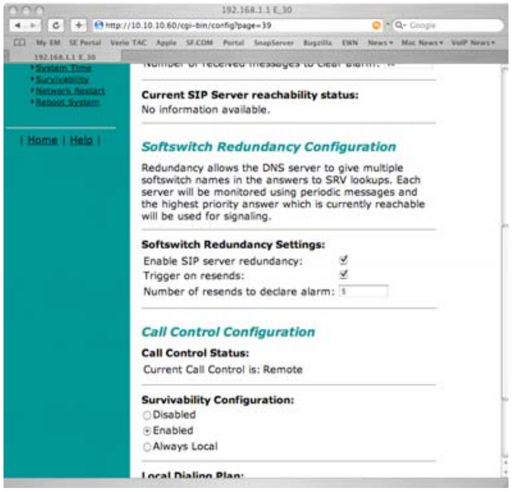
This step should be used if you have installed a PSTN gateway at the branch office location. In this case the IP address of the LAN side PSTN gateway must be configured in the V^{2}IU appliance to support inbound and outbound PSTN calling while in fallback mode of operation. This gateway resource may also be used by network based call processing servers when the WAN link is operational. In fallback mode when the call processing server cannot be reached the V^{2}IU appliance will route outbound calls to the LAN side PSTN gateway if a number is dialed that is not stored in its local dial plan (e.g. a local SIP user agent).

1. Log into the V^{2}IU appliance using a Netscape or Internet Explorer web browser.
2. Select System.
3. Select Survivability.
4. Press Submit.

Step 5 - Configure call processing server redundancy



Current SIP Server reachability status:
No information available.

Softswitch Redundancy Configuration

Redundancy allows the DNS server to give multiple softswitch names in the answers to SRV lookups. Each server will be monitored using periodic messages and the highest priority answer which is currently reachable will be used for signaling.

Softswitch Redundancy Settings:

Enable SIP server redundancy: ☑
Trigger on resends: ☑
Number of resends to declare alarm: 5

Call Control Configuration

Call Control Status:
Current Call Control is: Remote

Survivability Configuration:
○ Disabled
● Enabled
○ Always Local

Local Dialing Plan:

If you will be using multiple network based call processing servers then you will need to enable server redundancy and specify the time between DNS lookups in the V²IU appliance. Enabling redundancy allows a DNS server to provide a list of multiple call processing servers to the V²IU appliance in the answers to SRV lookups. Each server in the list will be monitored using periodic messages by the V²IU appliance and the highest priority server that is currently reachable will be used for signaling. The V²IU appliance uses the reachability settings described in step 2 to determine the status of remote servers and remove inoperable servers from the list.

Triggers can also be used by the V²IU appliance to determine when to forward call requests to a secondary server in the list. A trigger is set when a configured number of resends are received by the V²IU appliance from a SIP user agent attempting to place a call. When initiating a call a SIP user agent will send an INVITE message to the V²IU appliance that will then be forwarded to the primary server. In the event that the primary server fails before a reachability alarm has been declared using the heartbeat messages the user agent will resend INVITE messages until the trigger condition is met. At this point the V²IU appliance will forward the call request on to the secondary server in the list. Please use the following steps to enable redundancy and set triggers:

1. Log into the V²IU appliance using a Netscape or Internet Explorer web browser.
2. Select System.
3. Select Survivability.
4. Enter the Time between DNS lookups (in seconds) in the Softswitch Reachability section of the web page.
5. Select Enable SIP server redundancy in the Softswitch Redundancy Settings section of the web page.

6. Select Trigger on resends in the Softswitch Redundancy Settings section of the web page.
7. Enter the Number of resends to declare alarm.
8. Press Submit.

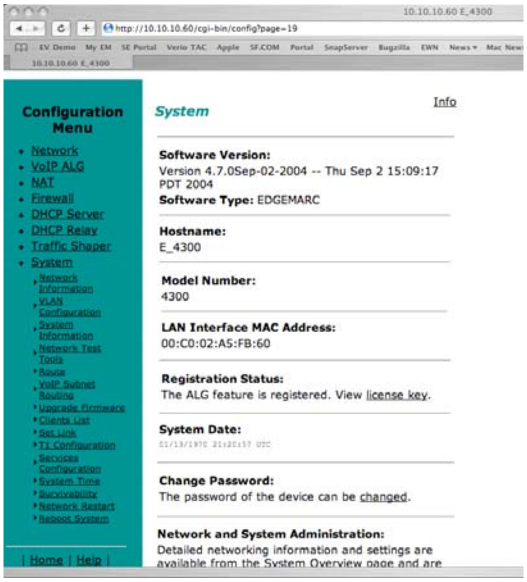
4

System Diagnostics

The 4300T provides a powerful set of diagnostic information, troubleshooting tools and utilities for system maintenance to network operators.

Viewing Software Version, Hardware Platform and the LAN MAC Address

The software version, hardware platform, and LAN MAC address are common pieces of information requested by technical support and are accessed directly through the System page of the 4300T web GUI.



System

Software Version:
Version 4.7.0Sep-02-2004 -- Thu Sep 2 15:09:17 PDT 2004
Software Type: EDGEMARC

Hostname:
E_4300

Model Number:
4300

LAN Interface MAC Address:
00:C0:02:A5:FB:60

Registration Status:
The ALG feature is registered. View license key.

System Date:
01/13/1970 21:20:57 UTC

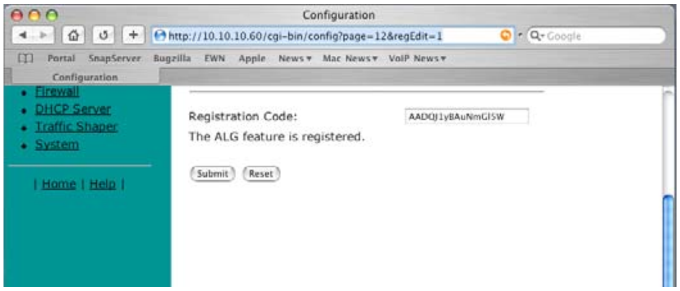
Change Password:
The password of the device can be changed.

Network and System Administration:
Detailed networking information and settings are available from the System Overview page and are

Viewing the ALG registration code

You will also find a link to the ALG registration code on the System page. The registration code enables the ALG and is pre-installed at the factory. If the registration code is inadvertently deleted you can re-enter the code using the following steps:

Enter the Registration Code



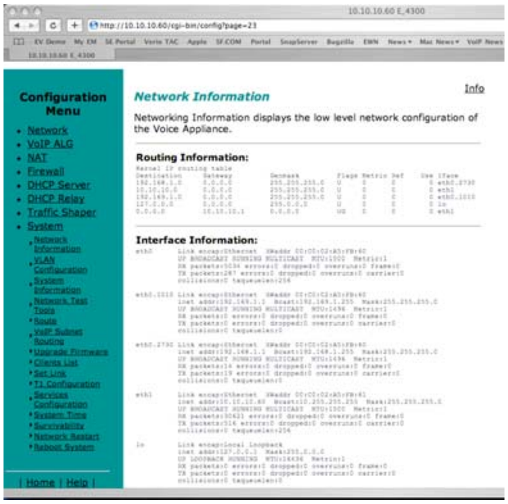
Registration Code: AADQJ1yBAuNmGI5W

The ALG feature is registered.

1. Select System.
2. Select registration code.
3. Select Edit Registration Code.
4. Enter the Registration Code.

   The registration code can be found on the sticker located on the bottom of the 4300T.
5. Press Submit.

Viewing Networking Information



Network Information

Networking Information displays the low level network configuration of the Voice Appliance.

Routing Information:

```
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
192.168.1.0     0.0.0.0         255.255.255.0   U     0      0        0 eth0.2730
10.10.10.0      0.0.0.0         255.255.255.0   U     0      0        0 eth1
192.169.1.0     0.0.0.0         255.255.255.0   U     0      0        0 eth0.1010
127.0.0.0       0.0.0.0         255.0.0.0       U     0      0        0 lo
0.0.0.0         10.10.10.1      0.0.0.0         UG    0      0        0 eth1
```

Interface Information:

```
eth0      Link encap:Ethernet  HWaddr 00:C0:02:A0:FB:40
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:5034 errors:0 dropped:0 overruns:0 frame:0
          TX packets:287 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:256

eth0.1010 Link encap:Ethernet  HWaddr 00:C0:02:A0:FB:40
          inet addr:192.169.1.1  Bcast:192.169.1.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1496  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0

eth0.2730 Link encap:Ethernet  HWaddr 00:C0:02:A0:FB:40
          inet addr:192.168.1.1  Bcast:192.168.1.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1496  Metric:1
          RX packets:14 errors:0 dropped:0 overruns:0 frame:0
          TX packets:19 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0

eth1      Link encap:Ethernet  HWaddr 00:C0:02:A0:FB:41
          inet addr:10.10.10.60  Bcast:10.255.255.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:30621 errors:0 dropped:0 overruns:0 frame:0
          TX packets:516 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:256

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
```

To view the networking configuration and status of the 4300T proceed to the Network Information page as follows:

1. Select System.
2. Select System Overview.
3. Select Network Information.

The following networking information is displayed:

Routing Information

The system routing table contains the static routes for hosts and networks that are configured on the 4300T. If just the LAN and WAN IP addresses have been configured there will be four lines displayed:

- The private subnet will be associated with the LAN interface.
- A public subnet present for the WAN interface.
- An entry for the 4300T loopback interface
- The 4300T's default gateway forwarding to the WAN interface

Additional lines may be displayed depending on the contents of the Route and VoIP Subnet Routing pages. Each of the entries on these pages will cause an additional entry in the routing table.

Link Status

Link Status displays the status of the ethernet interfaces. Ethernet autonegotiation is often unreliable, especially between different vendors or old and new networking equipment. Failure of autonegotiation is generally not a cause for concern. However, if the negotiated rates change intermittently or the link is reported as down or no link, the link rate may need to be set manually on the Set Link Rate page. Intermittent data and voice outages may be caused by link flapping when the two endpoints of the Ethernet cable cannot reach agreement using autonegotiation". If the link rate is set manually, ensure that the device at the far end of the connection can communicate at the desired rate. Incompatible rates can cause a loss of communication with the 4300T.

Link status for the Ethernet ports is displayed via the LEDs adjacent to each physical port.

Interface Information

The specific status and configuration information for the system interfaces is displayed in the Interface Information section. HDLC0 shows the interface statistics for the T1/E1 WAN link. ETH0 shows the interface statistics for the internal LAN interface between the 4300T processor and the built-in LAN switch. Interface statistics for the external LAN ports are not displayed.

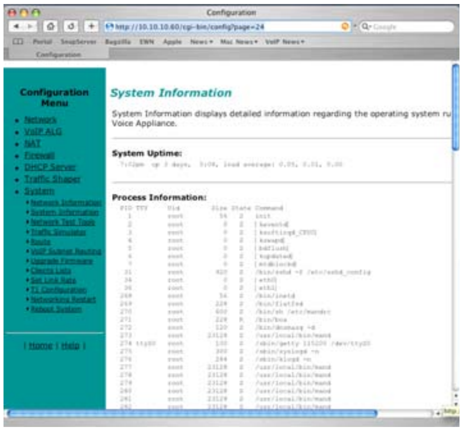
The interface statistics can point to areas of congestion in the network. If the errors statistic is a few percent or more of the total packets sent it may be an indication of excessive congestion on the network interface. If the congestion is not corrected the quality of voice calls will be affected. The topology of the network attached to the network interface with the errors should be examined and modified to better segment and isolate network traffic.

Viewing Advanced System Information

To view advanced system information for the 4300T proceed to the System Information page as follows:

1. Select System.
2. Select System Overview.
3. Select System Information.

The following system information is displayed:



System Information

System Information displays detailed information regarding the operating system ru

Voice Appliance.

System Uptime:

```
 [illegible]  up 3 days,  3:08,  load average: [illegible]
```

Process Information:

```
  PID TTY     Uid        Size State Command
    1         root         56   S   init
    2         root          0   S   [keventd]
    3         root          0   S   [ksoftirqd_CPU0]
    4         root          0   S   [kswapd]
    5         root          0   S   [bdflush]
    6         root          0   S   [kupdated]
    7         root          0   S   [mtdblockd]
   31         root        420   S   /bin/sshd -f /etc/sshd_config
   34         root          0   S   [eth0]
   36         root          0   S   [eth1]
  268         root         56   S   /bin/inetd
  269         root        228   S   /bin/flatfsd
  270         root        600   S   /bin/sh /etc/mandrc
  271         root        228   R   /bin/boa
  272         root        120   S   /bin/dnsmasq -d
  273         root      23128   S   /usr/local/bin/mand
  274 ttyS0   root        100   S   /sbin/getty 115200 /dev/ttyS0
  275         root        300   S   /sbin/syslogd -n
  276         root        284   S   /sbin/klogd -n
  277         root      23128   S   /usr/local/bin/mand
  278         root      23128   S   /usr/local/bin/mand
  279         root      23128   S   /usr/local/bin/mand
  280         root      23128   S   /usr/local/bin/mand
  281         root      23128   S   /usr/local/bin/mand
```

System Uptime

System Uptime displays the current time, the amount of time elapsed since the last system reboot, and the system load averages for the past 1, 5, and 15 minutes. Uptime can help trace when a power outage may have interrupted service. Load averages that remain greater than 2 indicate excessive system loading. Partitioning voice traffic using a second system may be required.

Process Information

Displays the active processes in the 4300T.

Memory Usage

Displays detailed memory allocation information that may be of use to technical support.

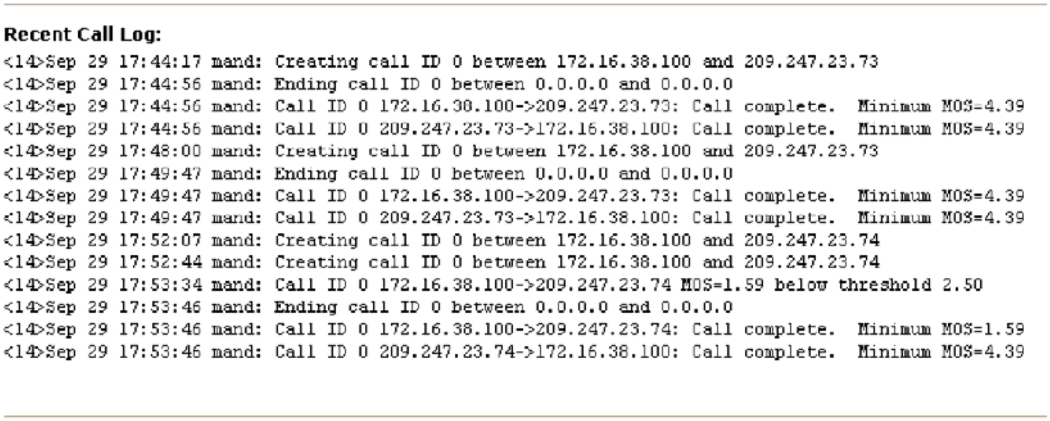
System Logging Messages

Displays information logged during system boot and normal operation. Logging messages may indicate unauthorized attempts to access the 4300T, process restart messages, and excessive resource utilization messages.

Passive Voice Call Monitoring

The 4300T monitors live voice calls and performs objective speech quality assessment. This information enables the network operator to assess voice quality for the purposes of SLA tracking or problem isolation. Mean Opinion Score (MOS) results for RTP streams in both directions of a VoIP call are calculated at call completion. This information along with the IP addresses of the VoIP endpoints supporting the call are logged locally and optionally sent to an external syslog server (see **Enable Remote System Logging** **<<<find this heading>>>** for instructions on enabling logging to a remote syslog server). Additionally the 4300T will generate a real-time message for any MOS values calculated less than 2.5 (considered poor quality) during an active call.

Voice call quality information is found locally in the System Logging Messages section of the System Information page and a sample output is provided below.



Recent Call Log:

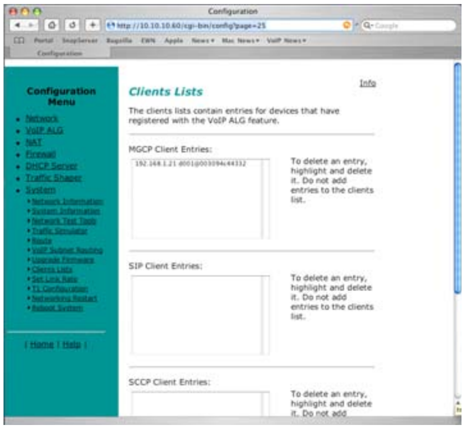
```
<14>Sep 29 17:44:17 mand: Creating call ID 0 between 172.16.38.100 and 209.247.23.73
<14>Sep 29 17:44:56 mand: Ending call ID 0 between 0.0.0.0 and 0.0.0.0
<14>Sep 29 17:44:56 mand: Call ID 0 172.16.38.100->209.247.23.73: Call complete.  Minimum MOS=4.39
<14>Sep 29 17:44:56 mand: Call ID 0 209.247.23.73->172.16.38.100: Call complete.  Minimum MOS=4.39
<14>Sep 29 17:48:00 mand: Creating call ID 0 between 172.16.38.100 and 209.247.23.73
<14>Sep 29 17:49:47 mand: Ending call ID 0 between 0.0.0.0 and 0.0.0.0
<14>Sep 29 17:49:47 mand: Call ID 0 172.16.38.100->209.247.23.73: Call complete.  Minimum MOS=4.39
<14>Sep 29 17:49:47 mand: Call ID 0 209.247.23.73->172.16.38.100: Call complete.  Minimum MOS=4.39
<14>Sep 29 17:52:07 mand: Creating call ID 0 between 172.16.38.100 and 209.247.23.74
<14>Sep 29 17:52:44 mand: Creating call ID 0 between 172.16.38.100 and 209.247.23.74
<14>Sep 29 17:53:34 mand: Call ID 0 172.16.38.100->209.247.23.74 MOS=1.59 below threshold 2.50
<14>Sep 29 17:53:46 mand: Ending call ID 0 between 0.0.0.0 and 0.0.0.0
<14>Sep 29 17:53:46 mand: Call ID 0 172.16.38.100->209.247.23.74: Call complete.  Minimum MOS=1.59
<14>Sep 29 17:53:46 mand: Call ID 0 209.247.23.74->172.16.38.100: Call complete.  Minimum MOS=4.39
```

Accessing Troubleshooting Tools

The 4300T provides convenient test tools to facilitate problem isolation and resolution. A network operator can use these tools to verify connectivity to/from the 4300T as well as trace datapaths to endpoints throughout the network.

Verify Registered Voice and Video Devices

The 4300T maintains a list of all registered voice and video devices called a clients list so that it can properly route voice and video calls. At startup, voice and video devices register their IP addresses with the 4300T. The 4300T then registers on behalf of the voice and video devices by providing its own WAN IP address to the softswitch, gatekeeper, or IP PBX. If a user or network operator reconfigures the IP address of the voice or video device (ie. an IP phone or IAD), it will re-register the new address with the 4300T. In this instance voice and video calls may be routed improperly because the 4300T clients list contains out of date information.



Clients Lists

The clients lists contain entries for devices that have registered with the VoIP ALG feature.

MGCP Client Entries:

192.168.1.21 d001@003094c44332

To delete an entry, highlight and delete it. Do not add entries to the clients list.

SIP Client Entries:

To delete an entry, highlight and delete it. Do not add entries to the clients list.

SCCP Client Entries:

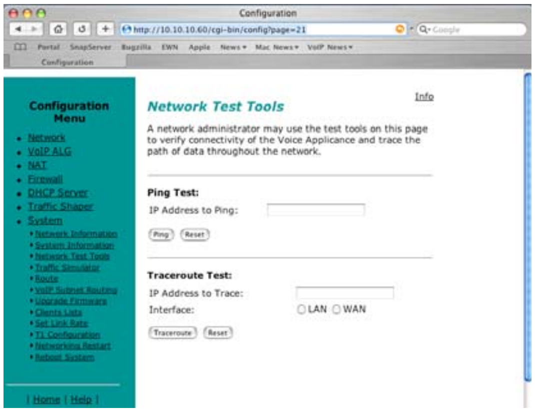
To delete an entry, highlight and delete it. Do not add

To update the clients list simply highlight and delete the stale entry using the following steps:

1. Select System.
2. Select System Overview.
3. Select Clients List.
4. Proceed to the appropriate signaling section, highlight the duplicate entry or entries and press the delete key on the keyboard
5. Press Submit.
6. Restart the VoIP ALG by following the instructions found in Restarting Networking Processes.

Performing a Ping Test

A ping test is the most common test used to verify basic connectivity to a networking device. Successful ping test results indicate that both physical and virtual path connections exist between the 4300T and the test IP address. Successful ping tests do not guarantee that all data traffic is allowed between the 4300T and the test IP address but is useful to verify basic reachability.



Network Test Tools

A network administrator may use the test tools on this page to verify connectivity of the Voice Applicance and trace the path of data throughout the network.

The following steps are used to perform a ping test:

1. Select System.
2. Select System Overview.
3. Select Network Test Tools.
4. Enter the IP Address to Ping.
5. Press Ping.

The Network Test Tools page will be refreshed and the results of the ping test are displayed (this may take several seconds). The Reset button is used to clear the IP address entry used in step D above.

Performing a Traceroute Test

A traceroute test is used to track the progress of a packet through the network. The test can be used to verify that data destined for a WAN device reaches the remote IP address via the desired path. Similarly, internal network paths can be traced over the LAN to verify the local network topology. The following steps are used to perform a traceroute test:

1. Select System.
2. Select System Overview.
3. Select Network Test Tools.
4. Enter the IP address to Trace.
5. Select either the WAN or the LAN radio button
6. Press Traceroute.

The Network Test Tools page will be refreshed and the results of the traceroute test are displayed (this may take several seconds). The Reset button is used to clear the IP address entry used in step D above.

Restarting Networking Processes

In extreme circumstances while troubleshooting you may be asked to restart the networking processes including the VoIP ALG in the 4300T by technical support. Use the following steps to restart the networking processes:

1. Select System.
2. Select System Overview.
3. Select Networking Restart.
4. Press restart.

Warning Restarting network services will interrupt the system for up to a minute. All voice and data sessions currently in progress will be interrupted.

Rebooting the 4300T

In extreme circumstances while troubleshooting you may be asked to reboot the 4300T by technical support. Please use the following steps to reboot the system:

1. Select System.
2. Select System Overview.
3. Select Rebooting System.
4. Press reboot.

Alternatively a reset can be performed locally by temporarily disconnecting the power cable from the 4300T.

Warning Rebooting the system will interrupt services for a few minutes. All voice and data sessions currently in progress will be interrupted.

5

Saving and Restoring the 4300T Configuration

The 4300T stores all configuration information for the system in a series of individual files that reside in local flash memory. These files are read at boot time to determine the configuration identity of the 4300T and then stored in RAM as “running” state. As you configure the 4300T the *submit* command writes the configuration changes to both RAM and flash so that the files stored in flash are always up to date with the running state of the system.

The 4300T provides a utility that enables you to copy the individual configuration files stored in flash to a single, consolidated backup file. This single file can then be used as a backup for the entire system and restored at a later date if necessary. Multiple backup files with different system configurations can also be created and stored locally in the 4300T or on remote TFTP servers.

Note

No more than 2 backup files can be stored in the 4300T’s flash due to size constraints. Also, it is recommended that you create a backup file after any configuration changes are made to the 4300T. This is to prevent the loss of any configuration changes made since your last backup in the event that you must restore the system configuration.

Backup file operations are performed in the 4300T CLI using the ewn command.

The ewn Command

The syntax for the `ewn` command is as follows:

USAGE:

```
ewn help|list
ewn save|load|delete [file name]
ewn upload|download [file name] [ip address]
```

where file name must use extension .conf1 or .conf2

The ewn command can be used with a local terminal connection or remotely using SSH.

1. Use a NULL modem cable to connect to serial port 1 of the 4300T
2. Use a terminal emulator such as Hyperterminal set to a baud rate of 9600, 8, 1 and none (databits, stop bits and parity)

Alternatively you can connect to the 4300T remotely using SSH:

1. Logon as root
2. Enter the password

Once you are at the command prompt (#) you can create the backup file, store it to local flash, copy it to a remote TFTP server, copy it from a remote TFTP server, delete it, load it or list all available backup files.

Create a Backup File and Save in Local Flash

# ewn save <filename>

Saves the current running configuration.

Filename format (must use extension .conf1 or .conf2):
<filename1>.conf1

<filename2>.conf2

<filenameX> can be a combination of both letters and characters. For example, EWN30_041503.conf1 or location1_E30.conf2. Trying to use any other filename format will result in the error message: “EWN_ERROR_BAD_FILE_NAME”.

Warning The “.conf” extensions have special significance. If you save a configuration with <filename-new>.conf1, then any existing <filename-old>.conf1 will be overwritten with the new one.

Copy a Backup File to a Remote TFTP Server

```
# ewn upload <filename> <tftp server IP Address>
```

Copy a backup file from the 4300T to a TFTP server.

Download a Backup File from a Remote TFTP Server

```
# ewn download <filename> <tftp server IP Address>
```

Download a backup file from a TFTP server to the V²IU.

List the Available Backup Files

```
# ewn list
```

List all backup files stored in FLASH. If no file has been saved, the command will only return the # prompt.

Delete a Backup File

```
# ewn delete <filename>
```

Delete the backup file specified in the filename.

Load a Backup File so that it Becomes the Running Configuration

```
# ewn load <filename>
```

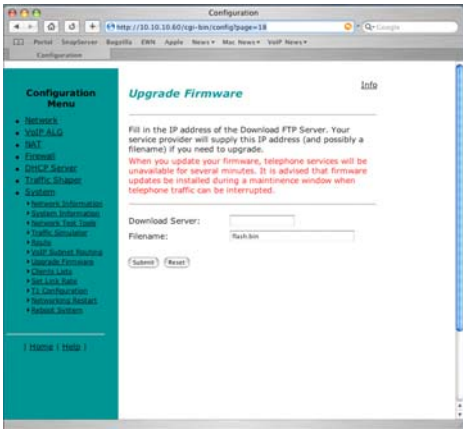
Loads the specified backup file into RAM and makes it the active running configuration.

Warning Issuing this command will automatically restart the 4300T and therefore interrupt any active voice calls and data sessions.

6

Upgrading the 4300T

This chapter describes how to upgrade your 4300T to the latest software release available from Polycom.



Upgrade Firmware

Fill in the IP address of the Download FTP Server. Your service provider will supply this IP address (and possibly a filename) if you need to upgrade.

When you update your firmware, telephone services will be unavailable for several minutes. It is advised that firmware updates be installed during a maintinence window when telephone traffic can be interrupted.

Download Server:

Filename: flash.bin

It is recommended that you reboot the 4300T prior to performing the upgrade. This is to make sure there is enough dynamic memory available to handle the upgrade process.

Warning

> When you update your software telephone services will be unavailable for several minutes. It is therefore advised that upgrades be performed during a maintenance window when telephone traffic can be interrupted.

Upgrade Procedure for Software Revision 1.3.11 or Later

Use this procedure if your 4300T is running software revision 1.3.11 or later. The software version can be found on the System page of the web GUI.

1. Select System.
2. Select System Overview.
3. Select Upgrade firmware.

4. Enter the Download Server address of ftp.support.polycom.com.
5. Enter the Filename: flash.bin
6. Press Submit.

   You can follow the progress of the upgrade by selecting the refresh the upgrade status link.

Warning Do not change the configuration or power off the device until the write is 100 percent complete. The 4300T may become unusable if the write is interrupted. The flash write can take up to 5 minutes depending on the speed of the download server.

   The system will automatically restart after the new image has been loaded.

7. Verify that the upgrade was successful by checking the software revision number found on the System page.

Appendix

Troubleshooting Tips

This section contains possible solutions to problems regarding the installation of the 4300T.

I am having trouble reaching the Internet through the 4300T.

We recommend connecting a PC directly (or via a switch) to the LAN port of the 4300T. The default LAN IP address of the 4300T is 192.168.1.1 so please be sure that the IP address of the PC is on the same network (eg. 192.168.1.2). Once you have connected please verify that the IP configuration information in the *Network* page is correct. Some other items to try:

- Ping the WAN interface of the 4300T from the attached PC
- Ping the DNS server for your network. Sometimes connectivity problems occur when the domain name being used cannot be mapped to the proper IP address.
- Ping a well known address on the Internet.
- Ping the IP address of the remote softswitch or IP PBX.

I do not receive dial tone when going "off hook" or my phone will not register with the softswitch/IP PBX.

- Verify the configurations on the *VoIP ALG* page.
- Check that the ALG registration code is configured.

1. Select System.

2. Select registration code.

- Attempt to ping the softswitch using the ping tool in the web GUI.

3. Select System.

4. Select System Overview.

5. Select Network Test Tools.
6. Enter the softswitch address in the IP Address to Ping field.
7. Press Ping.

Specifications

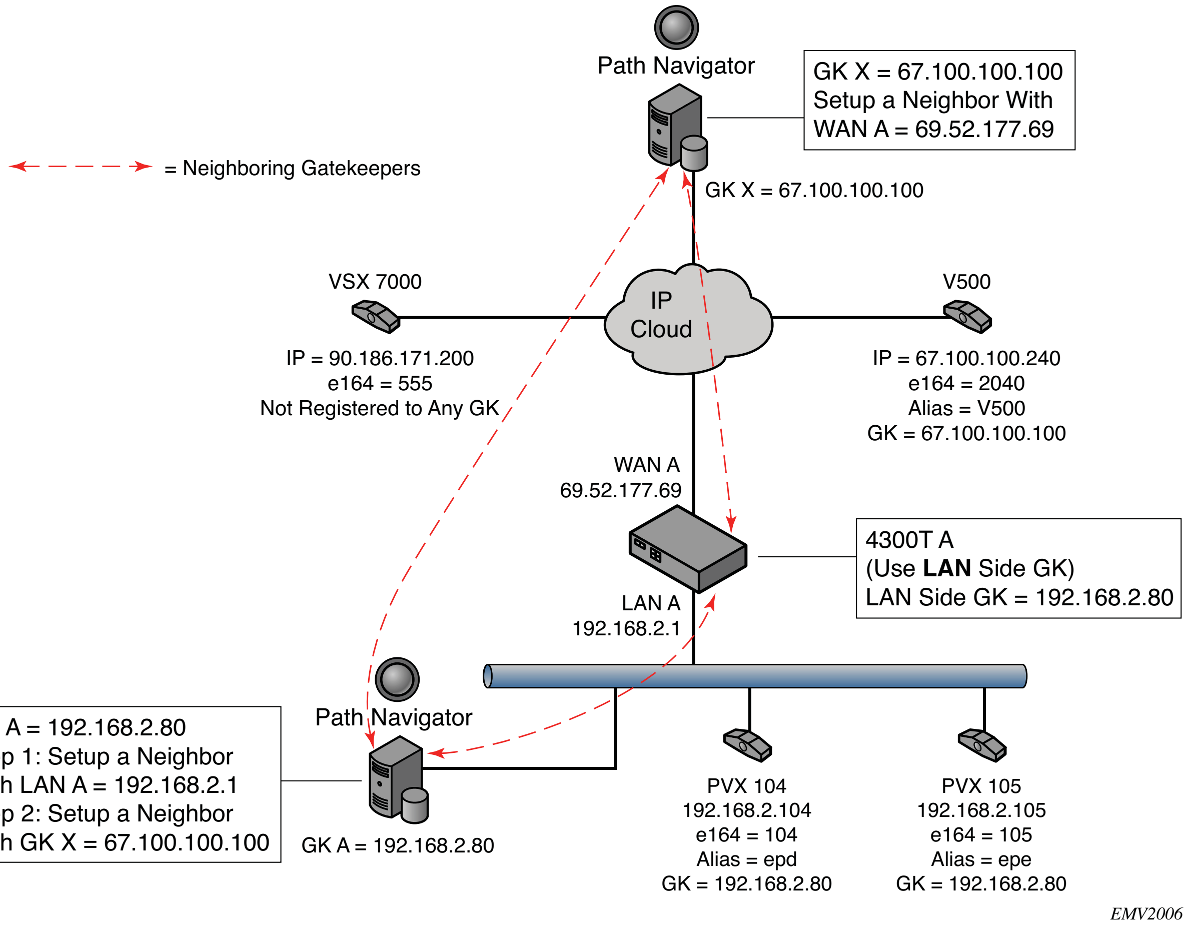
WAN Ports	1xT1 CSU/DSU or 10/100 Ethernet
LAN Ports	4x10/100 Ethernet (switched)
Serial Ports	1xRS-232
Dimensions	Height (1.7”), Width (10”), Depth (7”)
Weight	2 lb
Power	12V 3A
Warranty	1 Year

Appendix

Neighboring Path Navigator Gatekeeper support

Example 1

In this example, there are two neighbored Path Navigator gatekeepers, one behind an EdgeMarc, on a private network, and the other on the public network.



All V2IU's running VOS Version 5.8.0

PathNavigator running version 7.00.01 (7.00.01.0185)

V2IU A

1. Setup the Network settings.
   - a LAN interface IP address = 192.168.2.1
   - b LAN interface subnet = 255.255.255.0
   - c WAN interface IP address = 69.52.177.69
   - d WAN interface subnet = 255.255.255.0
   - e Default Gateway = 69.52.177.1
2. Setup the VoIP ALG – H323 settings

   V2IU A is set to use a LAN side gatekeeper, which is 192.168.2.80

   - a Gatekeeper Mode = LAN/Subscriber side gatekeeper
   - b LAN / Subscriber side Gatekeeper Address = 192.168.2.80

Gatekeeper A

1. On the Path Navigator A, setup the IP configuration as
   - a IP address = 192.168.2.80
   - b Subnet mask = 255.255.255.0
   - c Default Gateway = 192.168.2.1
2. Setup two Neighboring Gatekeeper profiles.
   (*Configuration – Neighboring Gatekeeper – Neighbors – Add*)
   - a In the Add Neighbor Gatekeeper dialog box, add the IP address of the LAN side V2IU A (192.168.2.1). Click OK.

Note The reason for setting up the Neighboring statement with the LAN side of the V2IU A is to enable outbound dialing from standalone endpoints on the public network.

   - a In the Add Neighbor Gatekeeper dialog box, add the IP address of the Path Navigator on the public network , GK X (67.100.100.100). Click OK.

Gatekeeper X

1. Setup the Neighbor Gatekeeper profile.
   (*Configuration – Neighboring Gatekeeper – Neighbors – Add*)

   In the Add Neighbor Gatekeeper dialog box, add the IP address of the WAN side V2IU A (69.52.177.69). Click OK.

Endpoints

1. Configure the video endpoints as shown in the diagram above.

   The PVX 104, 105 endpoint's gatekeeper is GK A, 192.168.2.80

   The V500 is a registered to GK X, 67.100.100.100.

   The VSX7000 is a standalone and is not registered to any gatekeeper.

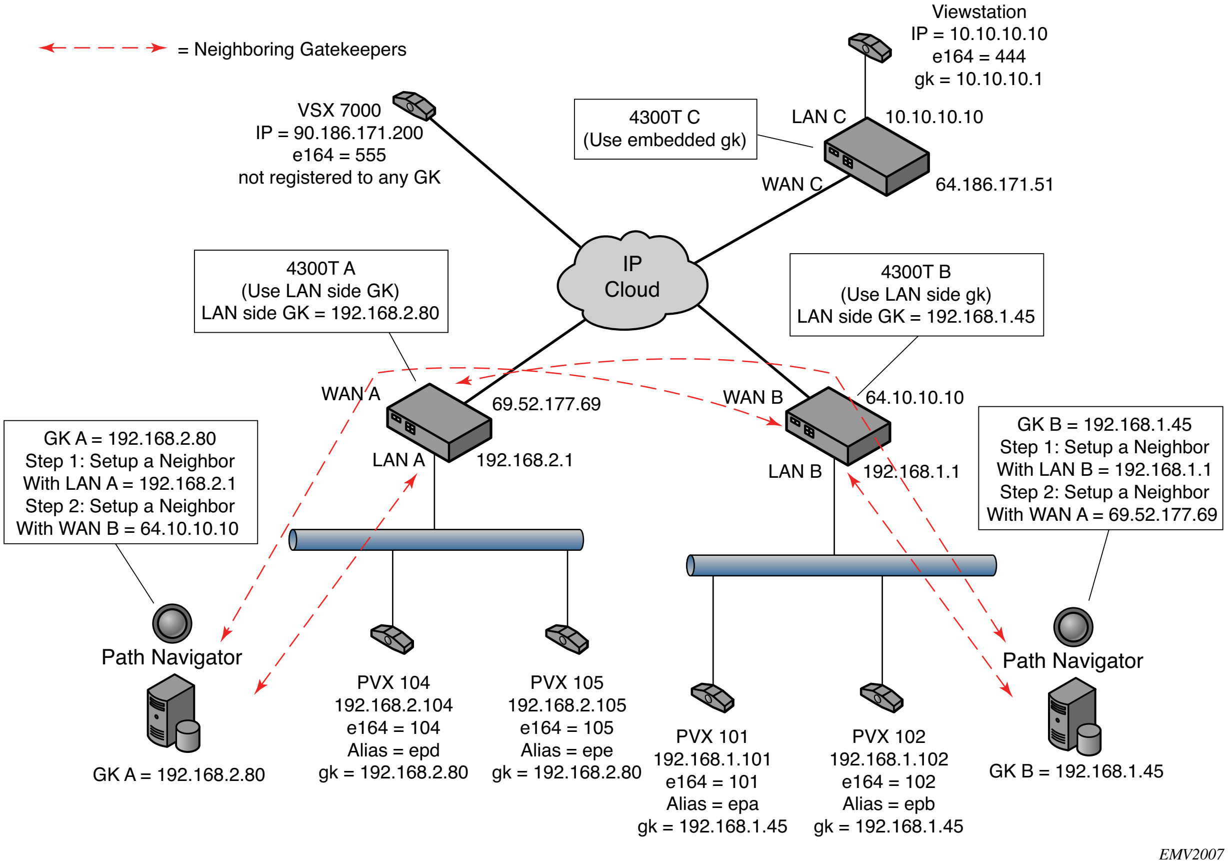
Dialing plans

Source	Destination	Dial string
PVX 104	PVX 105	(e164) 105 (H323 alias) epe
PVX 105	PVX 104	(e164) 104 (H323 alias) epd
V500	PVX 104	(e164 104 (H323 alias) epd
PVX 104 / PVX 105	V500	(e164) 2040 (H323 alias) V500 (string) 2040@67.100.100.100
VSX 7000	PVX 104 PVX 105	(IP + Ext) 66.52.177.69 , 104 66.52.177.69 , 105
PVX 104 / PVX 105	VSX7000	(string) 555@64.186.171.200

Example 2

In this example, there are two neighbored Path Navigator gatekeepers, one behind one V2IU, on a private network, and the other behind another V2IU, on a separate private network.

There is also a codec behind a third V2IU, just as an example. V2IU C is just a remote V2IU running in the embedded gatekeeper mode.



All V2IU’s running VOS Version 5.8.0

PathNavigator running version 7.00.01 (7.00.01.0185)

V2IU A

1. Setup the Network settings.

   a LAN interface IP address = 192.168.2.1

   b LAN interface subnet = 255.255.255.0

   c WAN interface IP address = 69.52.177.69

   d WAN interface subnet = 255.255.255.0

   e Default Gateway = 69.52.177.1

2. Setup the VoIP ALG – H323 settings

   V2IU A is set to use a LAN side gatekeeper, which is 192.168.2.80

   a Gatekeeper Mode = LAN/Subscriber side gatekeeper

   b LAN / Subscriber side Gatekeeper Address = 192.168.2.80

Gatekeeper A

1. On the Path Navigator (GK A), setup two Neighboring Gatekeeper profiles.
   (*Configuration – Neighboring Gatekeeper – Neighbors – Add*)

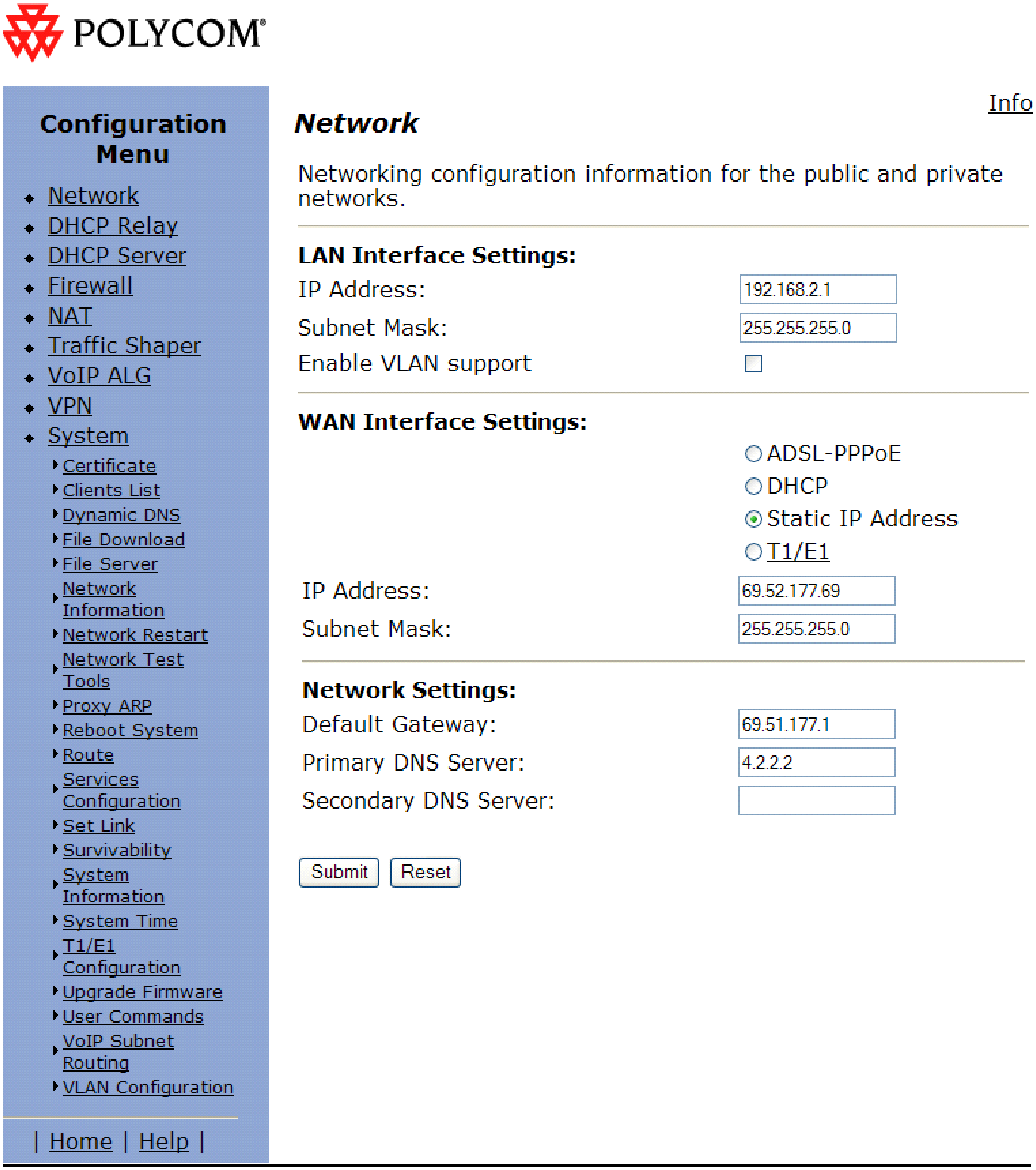
   a In the Add Neighbor Gatekeeper dialog box, add the IP address of the LAN side V2IU A (192.168.2.1). Click OK.

Note The reason for setting up the Neighboring statement with the LAN side of the V2IU A is to enable outbound dialing to standalone endpoints on the public network.

   a In the Add Neighbor Gatekeeper dialog box, add the IP address of the WAN side V2IU B (64.10.10.10). Click OK.

Note The reason for setting up the Neighboring statement with the WAN side of the V2IU B is to neighbor with the Path Navigator that is on the LAN side of V2IU B.

Network Settings



Network

Networking configuration information for the public and private networks.

LAN Interface Settings:

IP Address: 192.168.2.1

Subnet Mask: 255.255.255.0

Enable VLAN support □

WAN Interface Settings:

○ ADSL-PPPoE
○ DHCP
● Static IP Address
○ T1/E1

IP Address: 69.52.177.69

Subnet Mask: 255.255.255.0

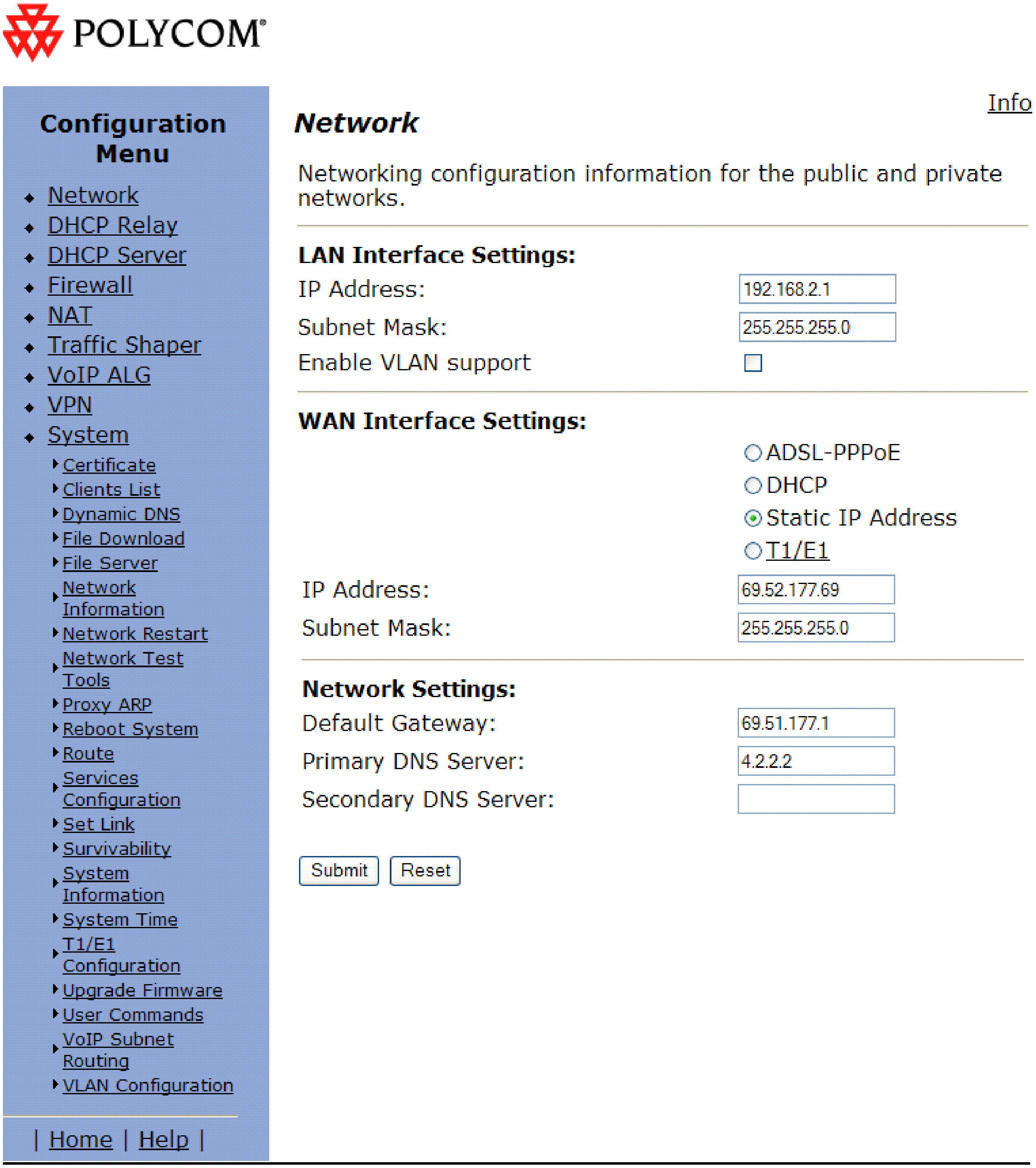
Network Settings:

Default Gateway: 69.51.177.1

Primary DNS Server: 4.2.2.2

Secondary DNS Server:

VoIP ALG – H323 Settings



Network

Networking configuration information for the public and private networks.

LAN Interface Settings:

IP Address: 192.168.2.1

Subnet Mask: 255.255.255.0

Enable VLAN support □

WAN Interface Settings:

○ ADSL-PPPoE
○ DHCP
● Static IP Address
○ T1/E1

IP Address: 69.52.177.69

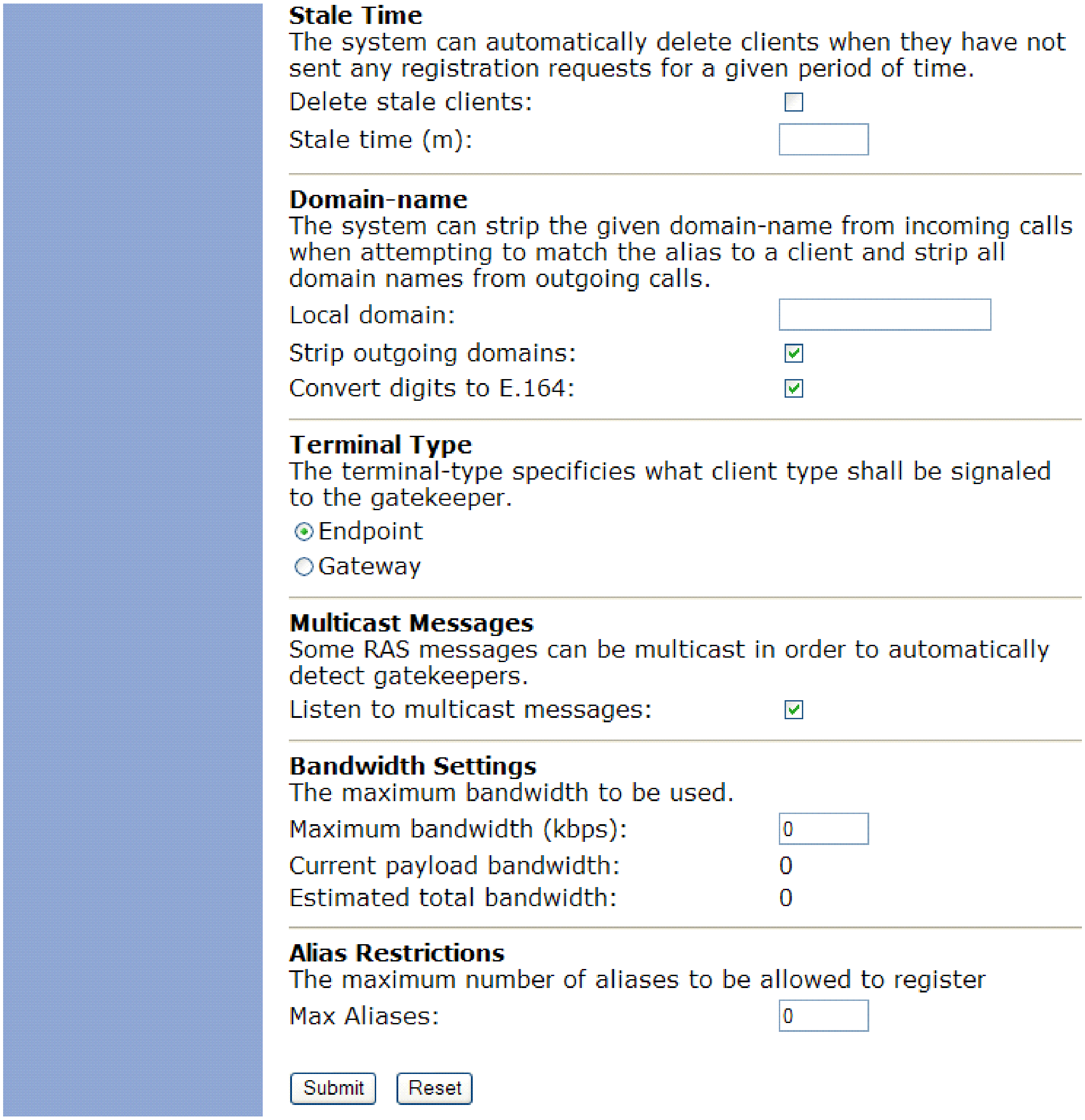
Subnet Mask: 255.255.255.0

Network Settings:

Default Gateway: 69.51.177.1

Primary DNS Server: 4.2.2.2

Secondary DNS Server:



Stale Time
The system can automatically delete clients when they have not sent any registration requests for a given period of time.

Delete stale clients: □

Stale time (m):

Domain-name
The system can strip the given domain-name from incoming calls when attempting to match the alias to a client and strip all domain names from outgoing calls.

Local domain:

Strip outgoing domains: ☑

Convert digits to E.164: ☑

Terminal Type
The terminal-type specificies what client type shall be signaled to the gatekeeper.

● Endpoint

○ Gateway

Multicast Messages
Some RAS messages can be multicast in order to automatically detect gatekeepers.

Listen to multicast messages: ☑

Bandwidth Settings
The maximum bandwidth to be used.

Maximum bandwidth (kbps): 0

Current payload bandwidth: 0

Estimated total bandwidth: 0

Alias Restrictions
The maximum number of aliases to be allowed to register

Max Aliases: 0

V2IU B

1. Setup the Network settings.
   (*Configuration -- Neighboring Gatekeeper -- Neighbors -- Add*)

   a LAN interface IP address = 192.168.1.1

   b LAN interface subnet = 255.255.255.0

   c WAN interface IP address = 64.10.10.10

   d WAN interface subnet = 255.255.255.0

   e Default Gateway = 64.10.10.1

2. Setup the VoIP ALG – H323 settings

   V2IU B is set to use a LAN side gatekeeper, which is 192.168.1.45.

   a Gatekeeper Mode = LAN / subscriber side gatekeeper

   b LAN / subscriber side Gatekeeper Address = 192.168.1.45

Gatekeeper B

3. On the Path Navigator (GK B), setup two Neighboring Gatekeeper profiles.

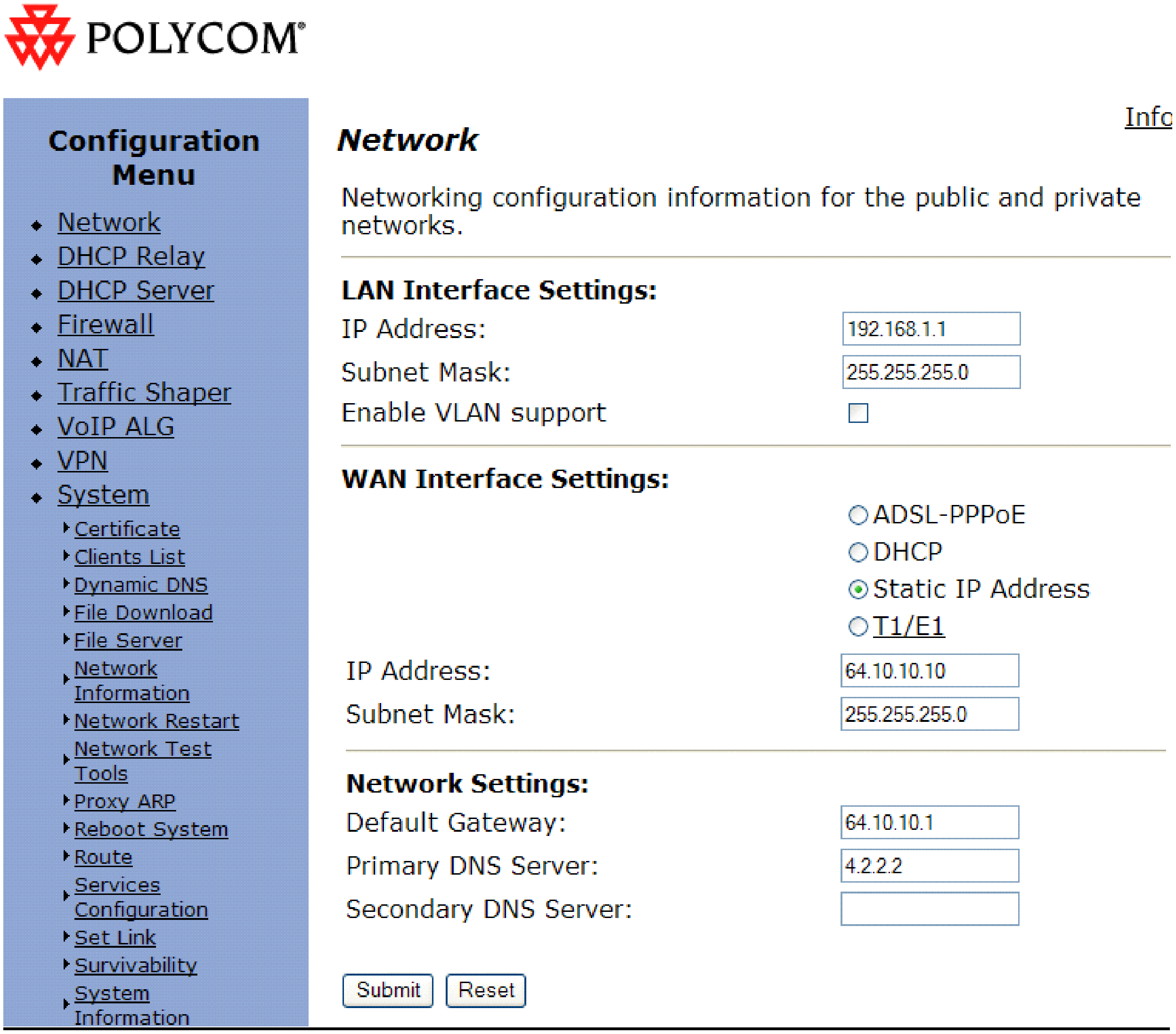
   a In the Add Neighbor Gatekeeper dialog box, add the IP address of the LAN side V2IU B (192.168.1.1). Click OK.

Note The reason for setting up the Neighboring statement with the LAN side of the V2IU B is to enable outbound dialing to standalone endpoints on the public network.

   a In the Add Neighbor Gatekeeper dialog box, add the IP address of the WAN side V2IU A (69.52.177.69). Click OK.

Note The reason for setting up the Neighboring statement with the WAN side of the V2IU A is to neighbor with the Path Navigator that is on the LAN side of V2IU A.

Network Settings



Network

Networking configuration information for the public and private networks.

LAN Interface Settings:

IP Address:	192.168.1.1
Subnet Mask:	255.255.255.0
Enable VLAN support	□

WAN Interface Settings:

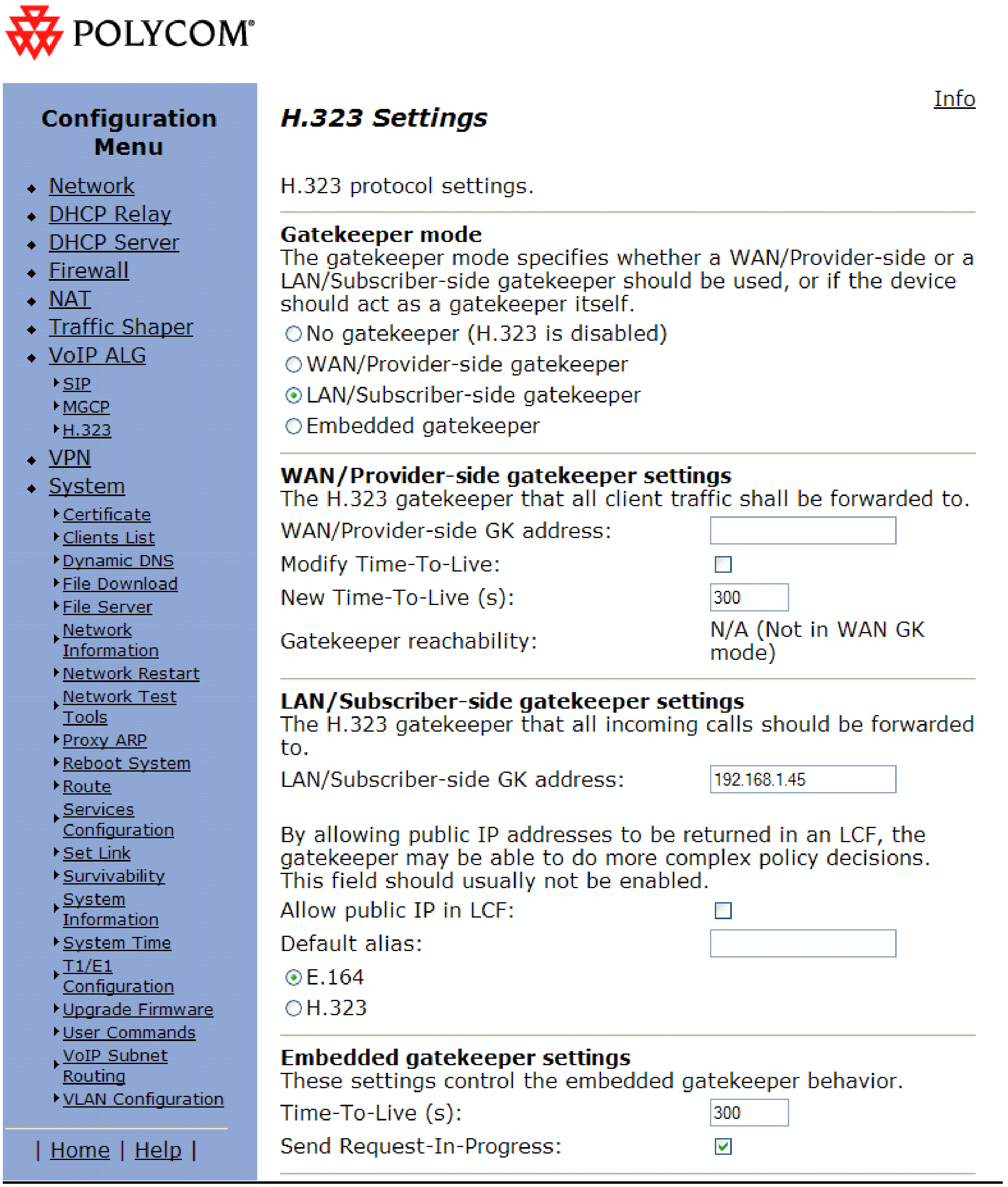
○ ADSL-PPPoE
○ DHCP
● Static IP Address
○ T1/E1

IP Address:	64.10.10.10
Subnet Mask:	255.255.255.0

Network Settings:

Default Gateway:	64.10.10.1
Primary DNS Server:	4.2.2.2
Secondary DNS Server:	

VoIP ALG – H323 settings



H.323 Settings

H.323 protocol settings.

Gatekeeper mode
The gatekeeper mode specifies whether a WAN/Provider-side or a LAN/Subscriber-side gatekeeper should be used, or if the device should act as a gatekeeper itself.

○ No gatekeeper (H.323 is disabled)
○ WAN/Provider-side gatekeeper
● LAN/Subscriber-side gatekeeper
○ Embedded gatekeeper

WAN/Provider-side gatekeeper settings
The H.323 gatekeeper that all client traffic shall be forwarded to.

WAN/Provider-side GK address:	
Modify Time-To-Live:	□
New Time-To-Live (s):	300
Gatekeeper reachability:	N/A (Not in WAN GK mode)

LAN/Subscriber-side gatekeeper settings
The H.323 gatekeeper that all incoming calls should be forwarded to.

LAN/Subscriber-side GK address:	192.168.1.45

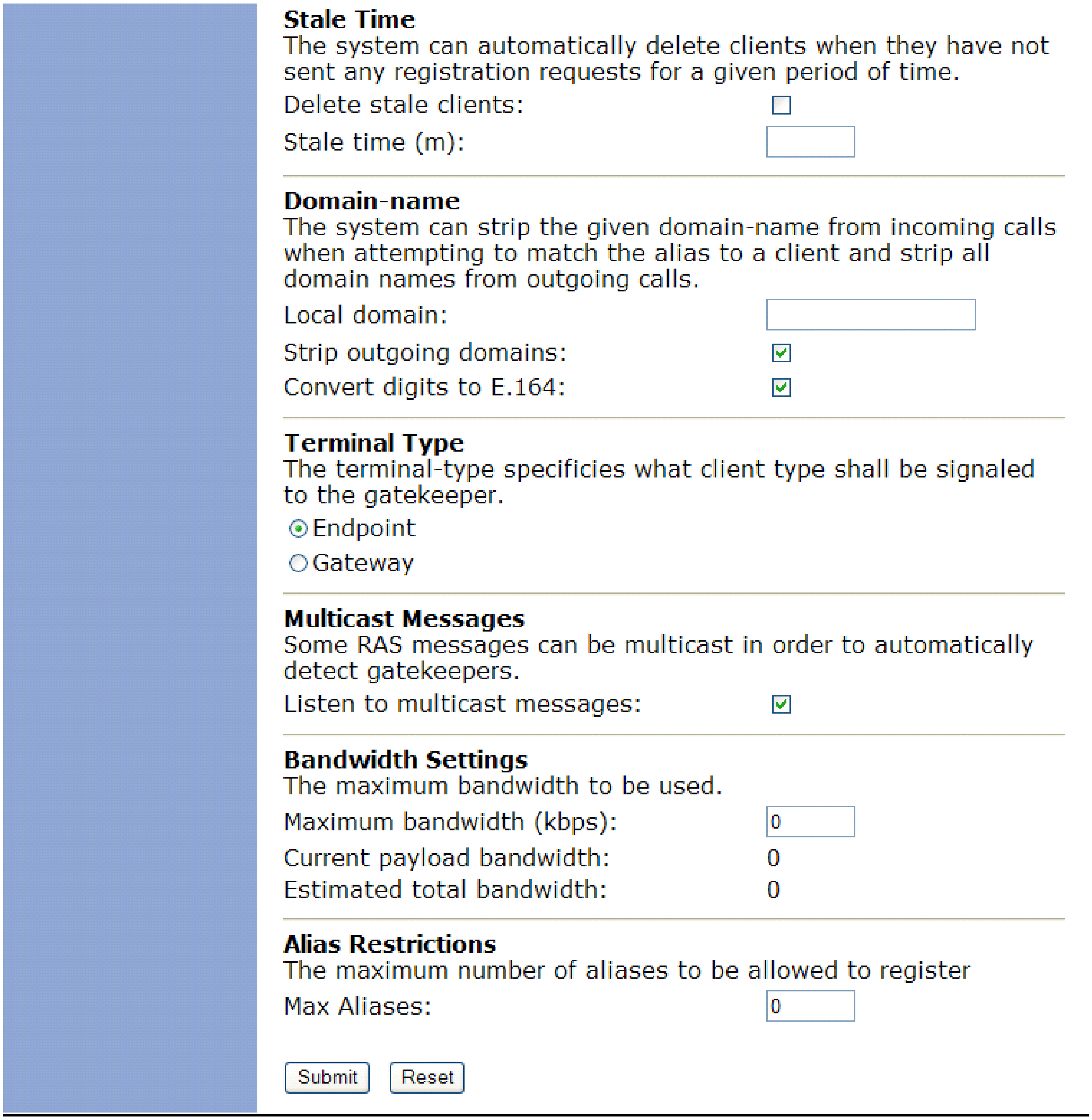
By allowing public IP addresses to be returned in an LCF, the gatekeeper may be able to do more complex policy decisions. This field should usually not be enabled.

Allow public IP in LCF:	□
Default alias:	

● E.164
○ H.323

Embedded gatekeeper settings
These settings control the embedded gatekeeper behavior.

Time-To-Live (s):	300
Send Request-In-Progress:	☑



Stale Time

The system can automatically delete clients when they have not sent any registration requests for a given period of time.

Delete stale clients: □

Stale time (m):

Domain-name

The system can strip the given domain-name from incoming calls when attempting to match the alias to a client and strip all domain names from outgoing calls.

Local domain:

Strip outgoing domains: ☑

Convert digits to E.164: ☑

Terminal Type

The terminal-type specificies what client type shall be signaled to the gatekeeper.

● Endpoint

○ Gateway

Multicast Messages

Some RAS messages can be multicast in order to automatically detect gatekeepers.

Listen to multicast messages: ☑

Bandwidth Settings

The maximum bandwidth to be used.

Maximum bandwidth (kbps): 0

Current payload bandwidth: 0

Estimated total bandwidth: 0

Alias Restrictions

The maximum number of aliases to be allowed to register

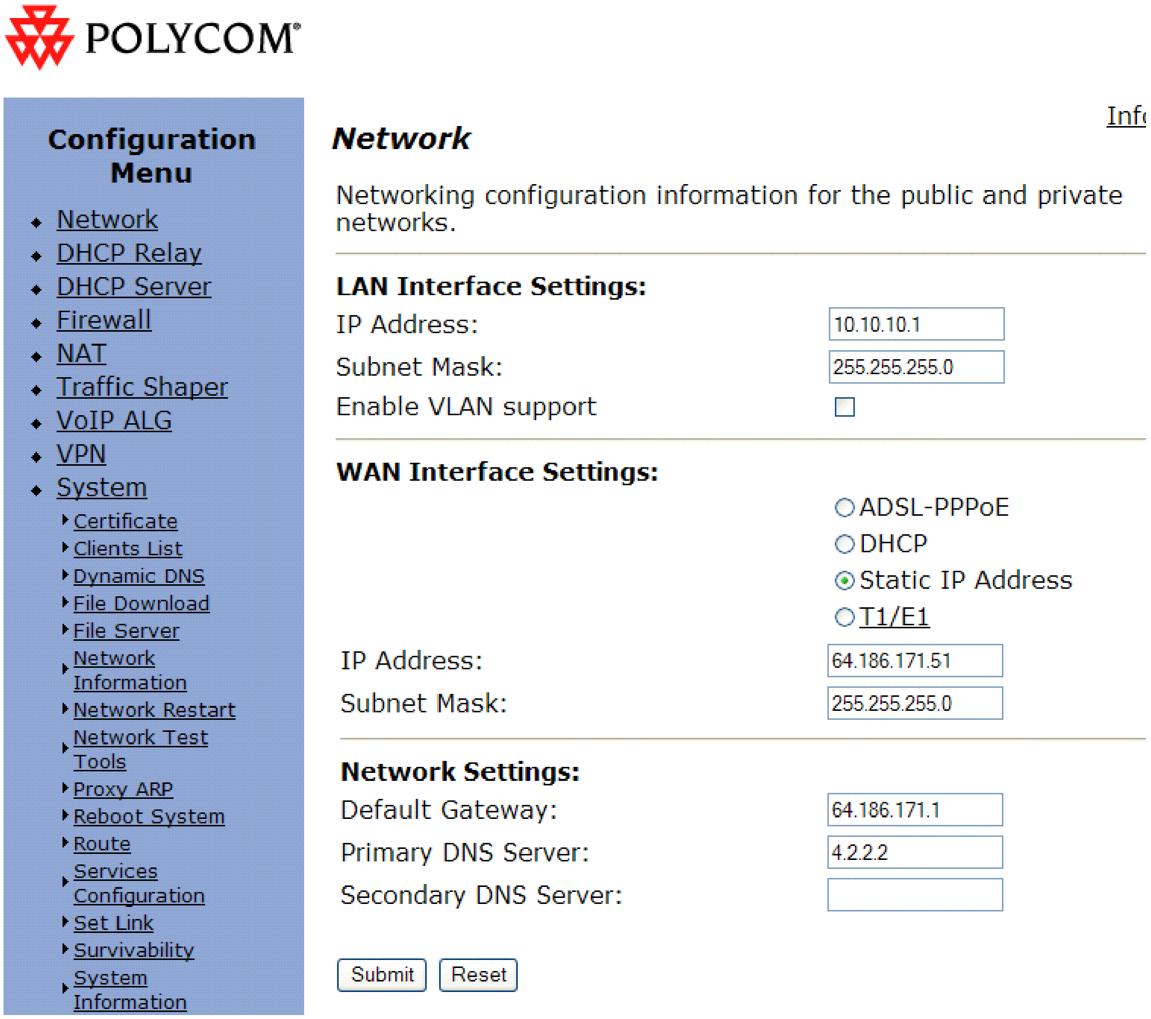
Max Aliases: 0

V2IU C

1. Setup the Network settings.
   - a LAN interface IP address = 10.10.10.1
   - b LAN interface subnet = 255.255.255.0
   - c WAN interface IP address = 64.186.171.51
   - d WAN interface subnet = 255.255.255.0
   - e Default Gateway = 64.186.171.1
2. Setup the VoIP ALG – H323 settings

   V2IU C is set to use a Embedded gatekeeper.

Network Settings



Network

Networking configuration information for the public and private networks.

LAN Interface Settings:

IP Address:	10.10.10.1
Subnet Mask:	255.255.255.0
Enable VLAN support	□

WAN Interface Settings:

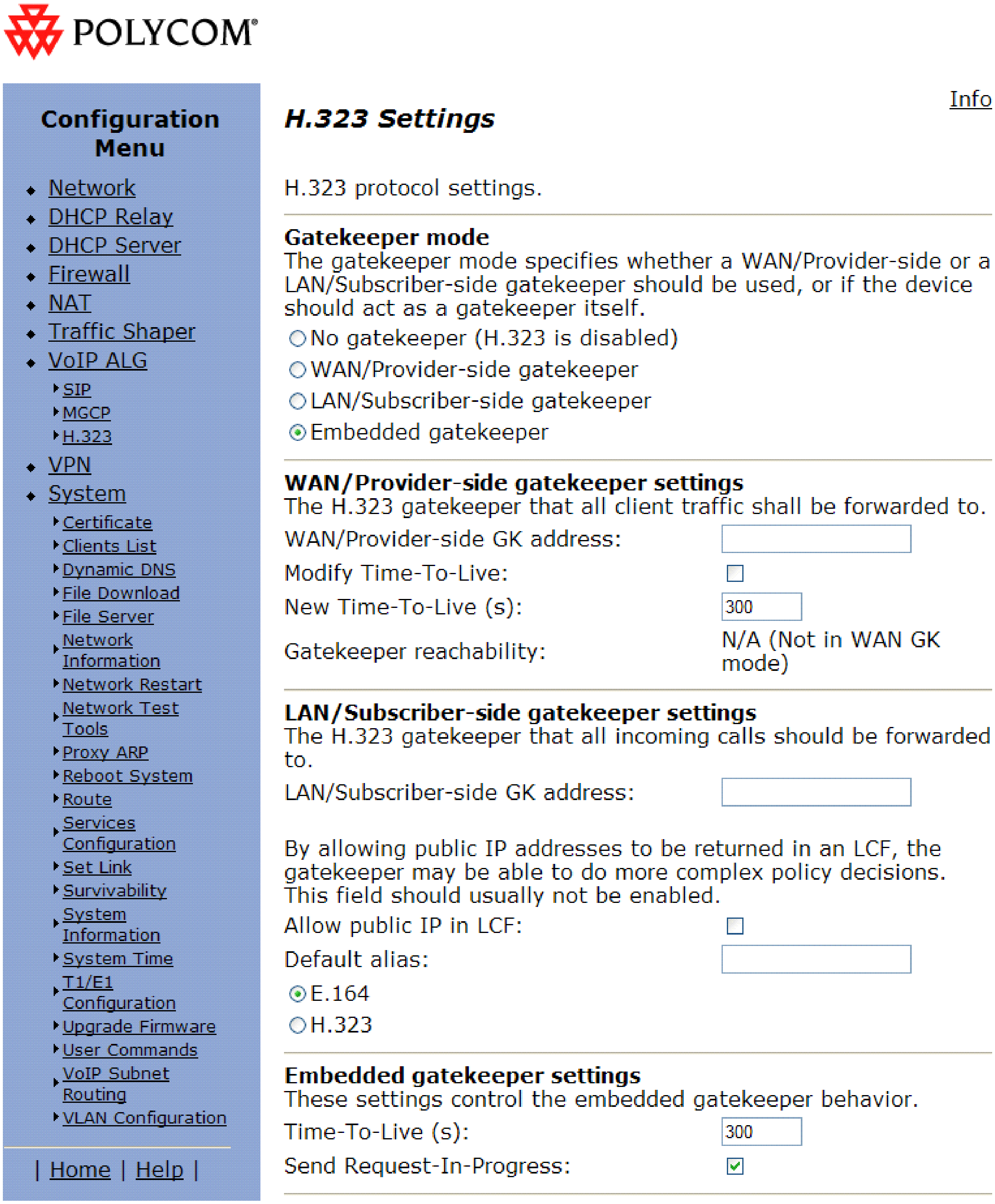
○ ADSL-PPPoE
○ DHCP
● Static IP Address
○ T1/E1

IP Address:	64.186.171.51
Subnet Mask:	255.255.255.0

Network Settings:

Default Gateway:	64.186.171.1
Primary DNS Server:	4.2.2.2
Secondary DNS Server:	

VoIP ALG – H323 Settings



H.323 Settings

H.323 protocol settings.

Gatekeeper mode
The gatekeeper mode specifies whether a WAN/Provider-side or a LAN/Subscriber-side gatekeeper should be used, or if the device should act as a gatekeeper itself.

○ No gatekeeper (H.323 is disabled)
○ WAN/Provider-side gatekeeper
○ LAN/Subscriber-side gatekeeper
● Embedded gatekeeper

WAN/Provider-side gatekeeper settings
The H.323 gatekeeper that all client traffic shall be forwarded to.

WAN/Provider-side GK address:	
Modify Time-To-Live:	□
New Time-To-Live (s):	300
Gatekeeper reachability:	N/A (Not in WAN GK mode)

LAN/Subscriber-side gatekeeper settings
The H.323 gatekeeper that all incoming calls should be forwarded to.

LAN/Subscriber-side GK address:

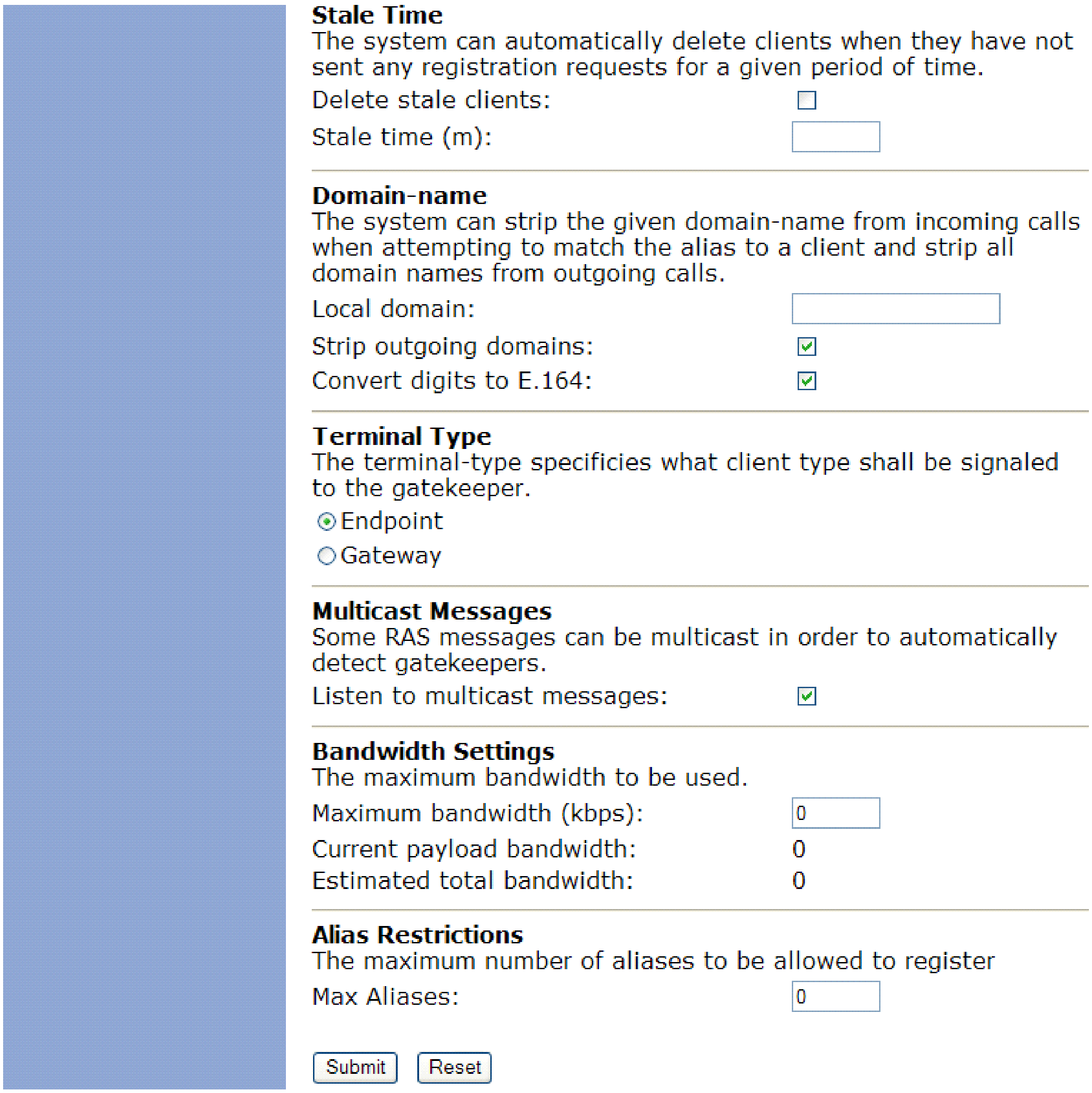
By allowing public IP addresses to be returned in an LCF, the gatekeeper may be able to do more complex policy decisions. This field should usually not be enabled.

Allow public IP in LCF:	□
Default alias:	

● E.164
○ H.323

Embedded gatekeeper settings
These settings control the embedded gatekeeper behavior.

Time-To-Live (s):	300
Send Request-In-Progress:	☑



Stale Time

The system can automatically delete clients when they have not sent any registration requests for a given period of time.

Delete stale clients: ☐

Stale time (m):

Domain-name

The system can strip the given domain-name from incoming calls when attempting to match the alias to a client and strip all domain names from outgoing calls.

Local domain:

Strip outgoing domains: ☑

Convert digits to E.164: ☑

Terminal Type

The terminal-type specificies what client type shall be signaled to the gatekeeper.

● Endpoint

○ Gateway

Multicast Messages

Some RAS messages can be multicast in order to automatically detect gatekeepers.

Listen to multicast messages: ☑

Bandwidth Settings

The maximum bandwidth to be used.

Maximum bandwidth (kbps): 0

Current payload bandwidth: 0

Estimated total bandwidth: 0

Alias Restrictions

The maximum number of aliases to be allowed to register

Max Aliases: 0

Endpoints

1. Configure the video endpoints as shown in the diagram above.

   The PVX 101 , 102 endpoint's gatekeeper = 192.168.1.45

   The PVX 104 , 105 endpoint's gatekeeper = 192.168.2.80

   The Viewstation's gatekeeper = 10.10.10.1

   The VSX7000 is a standalone and is not registered to any gatekeeper.

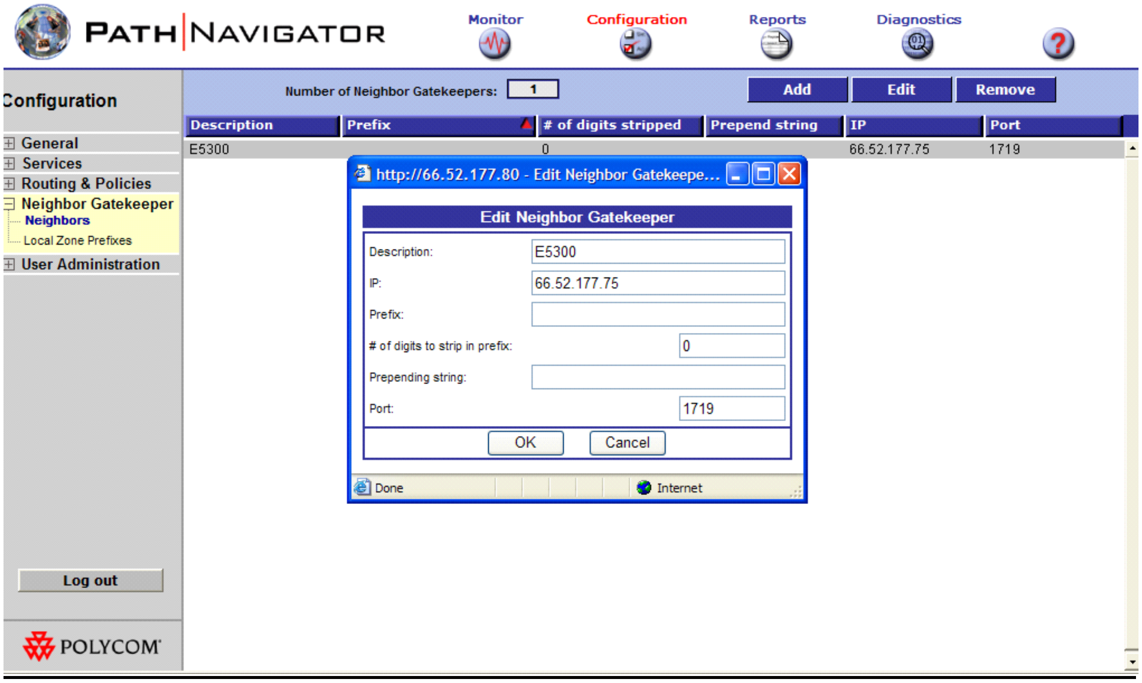
Dialing plans

Source	Destination	Dial string
PVX 101	PVX 102	(e164) 102 (H323 alias) epb
PVX 102	PVX 101	(e164) 101 (H323 alias) epa
PVX 101 / PVX 102	PVX 104	(e164) 104 (H323 alias) epd (string) 104@69.52.177.69
PVX 101 / PVX 102	PVX 105	(e164) 105 (H323 alias) epe (string) 104@69.52.177.69
PVX 104	PVX 105	(e164) 105 (H323 alias) epe
PVX 105	PVX 104	(e164) 104 (H323 alias) epd
PVX 104 / PVX 105	PVX 101	(e164) 101 (H323 alias) epa (string) 101@64.10.10.10
PVX 104 / PVX 105	PVX 102	(e164) 102 (H323 alias) epb (string) 102@64.10.10.10
Viewstation	PVX 101 PVX 102 PVX 104 PVX 105	(string) 101@64.10.10.10 102@64.10.10.10 104@69.52.177.69 105@69.52.177.69

Source	Destination	Dial string
PVX 101 / PVX 102 / PVX 103 / PVX 105 /	Viewstation	(string) 444@64.186.171.51
VSX 7000	PVX 101 PVX 102 PVX 104 PVX 105 Viewstation	(IP + Ext) 64.10.10.10 , 101 64.10.10.10, 102 69.52.177.69 , 104 69.52.177.69 , 105 64.186.171.51 , 444
PVX 101 / PVX 102 / PVX 104 / PVX 105 / Viewstation	VSX7000	(string) 555@90.186.171.200

Path Navigator

Defining a Neighboring Gatekeeper in the Path Navigator.



Number of Neighbor Gatekeepers: 1

Description	Prefix	# of digits stripped	Prepend string	IP	Port
E5300		0		66.52.177.75	1719

Description: E5300

IP: 66.52.177.75

Prefix:

# of digits to strip in prefix: 0

Prepending string:

Port: 1719

Regulatory Notices

Important Safeguards
Read and understand the following instructions before using the system: • Close supervision is necessary when the system is used by or near children. Do not leave unattended while in use. • Only use electrical extension cords with a current rating at least equal to that of the system. • Always disconnect the system from power before cleaning and servicing and when not in use. • Do not spray liquids directly onto the system when cleaning. Always apply the liquid first to a static free cloth. • Do not immerse the system in any liquid or place any liquids on it. • Do not disassemble this system. To reduce the risk of shock and to maintain the warranty on the system, a qualified technician must perform service or repair work. • Connect this appliance to a grounded outlet. • Only connect the system to surge protected power outlets. • Keep ventilation openings free of any obstructions. SAVE THESE INSTRUCTIONS.

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END OF TERMS AND CONDITIONS

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Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

FCC PART 68 NOTICE TO USERS OF DIGITAL SERVICE

This equipment complies with Part 68 of the FCC Rules and the requirements adopted by ACTA. On the bottom surface of this equipment is a label that contains, among other information, a product identifier in the format US: EWRDENAN4300T. If requested, this number must be provided to the telephone company.

The following instructions are provided to ensure compliance with the Federal Communications Commission (FCC) Rules, Part 68.

(1) This device must only be connected to the T1 WAN network.

(2) Before connecting your unit, you must inform the telephone company of the following information:

Port ID	REN/SOC	FIC	USOC
T1 WAN	04DU9-DN, 04DU9-BN	6.0N	RJ48C

(3) If the unit appears to be malfunctioning, it should be disconnected from the telephone lines until you learn if your equipment or the telephone line is the source of the trouble. If your equipment needs repair, it should not be reconnected until it is repaired.

(4) If the telephone company finds that this equipment is exceeding tolerable parameters, the telephone company can temporarily disconnect service, although they will attempt to give you advance notice if possible.

(5) Under the FCC Rules, no customer is authorized to repair this equipment. This restriction applies regardless of whether the equipment is in or out of warranty.

(6) If the telephone company alters their equipment in a manner that will affect use of this device, they must give you advance warning so as to give you the opportunity for uninterrupted service. You will be advised of your right to file a complaint with the FCC.

(7) In the event of equipment malfunction, all repairs should be performed by our Company or an authorized agent. It is the responsibility of users requiring service to report the need for service to our Company or to one of our authorized agents.

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Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by a user to this equipment, or equipment malfunctions, may give the telephone communications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection, that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas”.

Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

WARRANTY AND REPAIR SERVICE CENTER:

The RAM Group

Kent McDonald

kent.macdonald@theramgroup.com

(403) 266-5840 x 100

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